the OIL AND GAS JOURNAL

here it is... the New BJ Pyramid Tooth TONG DIE

POSITIVE GRIP... new BJ Pyramid style teeth give greater gripping surface and power even on flame-hardened tool joints and subs.

SAFER TO USE... soft ends... no eye injuries! BJ's exclusive "Selective Hardening" process creates an even, overall strength that spreads torque and impact shocks *over the entire die.*

LAST LONGER... tougher-than-ever—stay on the job longer—do more work—need fewer replacements. Can be driven into die slot—they won't chip—AND THEY'RE REVERSIBLE.

grips like a die has never gripped before!
–and it won't chip!

BJ tong dies are also available in Standard Tooth and Coarse Tooth styles. Made in all types for all tongs.

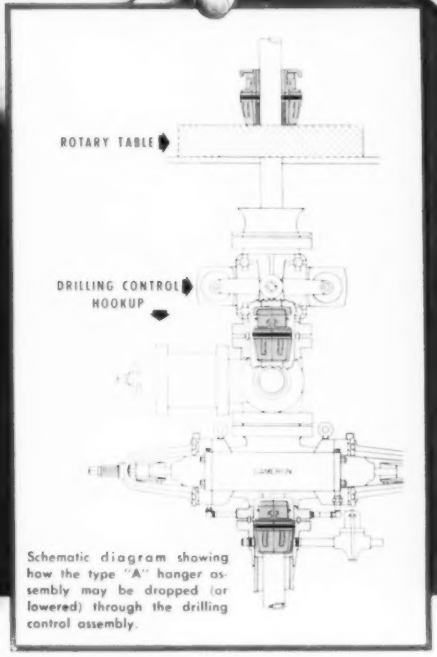
REMEMBER... look for the red box with the big "BJ." Stocked by supply stores in every field.

Another BJ Engineered Product

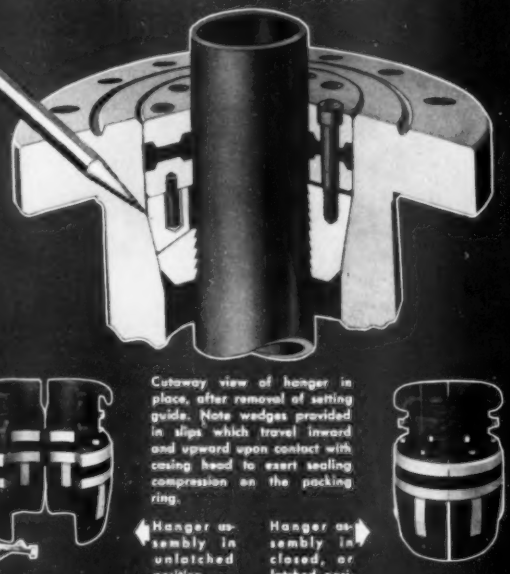
Byron Jackson Co.
Since 1872
MAIN OFFICE & PLANT: LOS ANGELES 54, CALIF.
Mid-Continent Office & Plant: Houston 1, Texas
Export Office: New York 17, New York
JOBBERS IN ALL PRINCIPAL OIL FIELDS

PRICE 50 CENTS TABLE OF CONTENTS PAGE 51 JULY 12, 1951

A — and to spell SAFETY in setting pipe!



Schematic diagram showing how the type "A" hanger assembly may be dropped (or lowered) through the drilling control assembly.



Cutaway view of hanger in place, after removal of setting guide. Note wedges provided in slips which travel inward and upward upon contact with casing head to exert sealing compression on the packing ring.

Hanger assembly in unlatched position.

Hanger assembly in closed, or latched, position.

Simply wrap, latch, and drop. The Cameron Type "A" Casing Hanger seals automatically — it never forgets. There's no chance for human error. The instant the hanger seats in the casing head and the pipe is suspended, the seal is made *automatically*. The preventers may be lifted without danger of a blowout between casing strings.

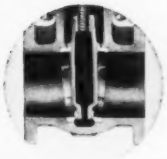
Installation is simple. The hanger assembly is either dropped through the rotary and preventers to its seat in the casing head, or it may be fastened to the pipe by means of set screws and lowered into the casing head while running pipe. A setting guide prevents the hanger from becoming "cocked" on the pipe when it is dropped through the preventers.

Interested operators are invited to write for complete details on the full line of Cameron Forged Steel Well Heads, or see the Cameron section in the new Composite Catalog of Oilfield Equipment.

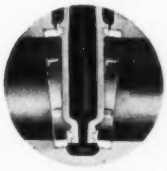
Cameron 1st *name in drilling control*

CAMERON IRON WORKS, INC.

P. O. Box 1212, Houston, Texas
Export: 74 Trinity Place, New York, N. Y.
Represented in the sterling area by: British Oil Field Equipment Co., Ltd., London, S.W.1



Straight-Flow Port Design reduces fluid turbulence to a practical minimum.



Seat Rings of end-seated type are screwed into the body.

Sure-Grip Malleable Handwheel for non-skid gripping even with heavy gloves.

WALWORTH

iron body gate valves

with screwed or flanged ends

... 8 Outstanding Features

For complete information on these new Walworth Iron Body Valves, see your local Walworth distributor, or write for bulletin 106.

Brass Liner on Glands assures greater resistance to corrosion and scoring.

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valves and fittings

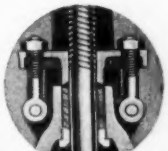
60 EAST 42nd STREET NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

T-head Disc-to-Stem connection on OS&Y types provides stronger connection, prevents loosening of disc by corrosion.

Bronze Back-Seat Bushings in bonnets of OS&Y valves.

Solid Web Type Disc in OS&Y valves for greater strength and longer service.



Hinged Gland Eye-Bolts on OS&Y valves permit faster, easier repacking under full pressure.

The Oil and Gas Journal, published Thursdays by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $3 yearly. Copyright 1951.

STAND OUT

..because it stands up!

Check the advantages of Fairbanks-Morse General Purpose Motors and you'll see why they deliver *stand out* performance . . . *stand up* under the heavy starting loads and long period peak capacity operation of oil field service.

Take the exclusive, one-piece Copperspun Rotor for example and note these advantages:

- ★ A truly one-piece indestructible copper rotor winding.
- ★ Withstands higher temperatures: (melting point 2,000° F. for Copper, 1,100° F. for Aluminum).
- ★ High electrical and thermal conductivity.
- ★ Dense, uniform grain structure.
- ★ Separately mounted fans: permitting complete overall machining, better quality control, better dynamic balance.

Then consider the unique one-piece cast frame that protects the motor against falling particles and dripping liquids in *any position* . . . the cross-flow ventilation that assures uniform, cool operating temperatures and the many other advantages your supply store will be happy to demonstrate. Easy to see why Fairbanks-Morse should be your choice for *stand out* motor service. Fairbanks, Morse & Co., Chicago 5, Illinois.

FAIRBANKS-MORSE,

a name worth remembering

OIL FIELD EQUIPMENT • PUMPS • SCALES
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for 24 years AQUAGEL

has meant *FAST, STRAIGHT DRILLING* to operators everywhere

Since 1928 drillers in all parts of the world have used AQUAGEL, finest of the bentonites, to insure trouble-free drilling. The use of AQUAGEL as a mud base, or to condition mud already in use, has eliminated mud troubles and overcome drilling problems in tens of thousands of wells. Here are some of the reasons why AQUAGEL in the well means faster, more economical drilling:

1. HIGH YIELD—One ton of AQUAGEL yields 100 barrels of 15-centipoise drilling mud in fresh water. This high yield means a lower cost per barrel of drilling mud.

2. LOW WATER LOSS—AQUAGEL muds have inherent low water losses. Chemical treatment will result in further water loss reduction. Where minimum water losses are required AQUAGEL muds are the ideal base muds. The colloids in AQUAGEL are compatible with all other materials used in fresh water drilling mud.

3. THIN FRIABLE FILTER CAKE—AQUAGEL muds deposit thin filter cakes having low permeabilities. These thin filter cakes promote freedom of pipe movement and offer minimum resistance to removal upon completion of the well.

4. REDUCES ABRASION—AQUAGEL in the mud produces a film of slippery gel which lubricates everything it touches. Thus sand and cuttings are made less abrasive, liner life is extended, drill pipe torque is reduced, and the movement of tools is facilitated.

5. CHECKS MILD CIRCULATION LOSSES—The efficient AQUAGEL filter cake deposited on the face of a coarse sand or other mildly permeable formation frequently will be all that is needed to stop loss of fluid from the hole.

6. UNEXCELLED SUSPENDING QUALITIES—AQUAGEL is unexcelled in preventing settling of weight material, holding cuttings in suspension, transporting cuttings out of the hole.

7. MUD CONDITIONER—AQUAGEL in the mud provides the particular type of colloidal material which is essential to the maintenance of good mud properties.

8. UNIFORMITY—Only the finest bentonites qualify for AQUAGEL. Baroid maintains the highest standards of product quality control in the industry. Operators can rely on AQUAGEL'S consistent performance anywhere in the country.

500 Baroid distributors have AQUAGEL ready to deliver when you want it!

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NATIONAL LEAD COMPANY
LOS ANGELES 12 • TULSA 3 • HOUSTON 2

COMPLETE DRILLING MUD SERVICE

Great AMERICANS

Pumping Unit T12 - D57

Reduce Maintenance Time with
AMERICAN PUMPING UNITS

Longer service with less servicing. That's the record of American Pumping Units . . . many in the field for 15 years and longer. Write for Catalog 151. Contact your favorite supply store or the nearest American office.

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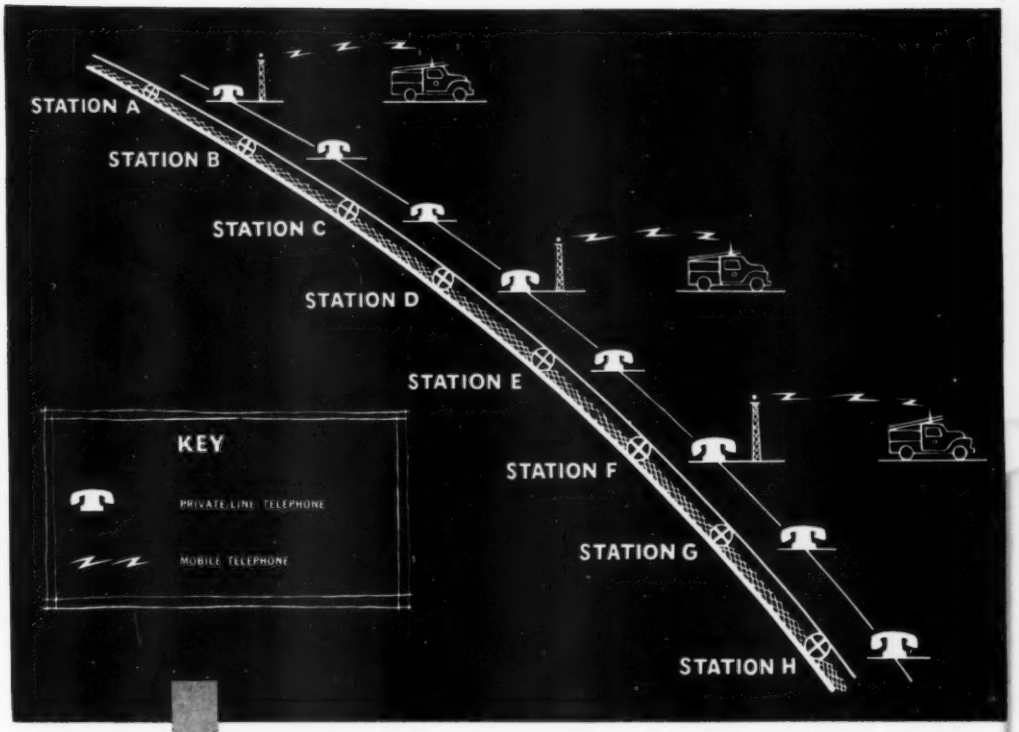


How much communications do you really need?

No two pipe lines are exactly alike—in their size or shape, in the terrain they cover, in the jobs they do. So no two pipe lines have exactly the same communications needs.

Step by step with the pipe-line industry, the Bell System has been developing communications that come as close as possible to fitting your needs.

The Bell System means service. The service we provide varies with the needs. We provide—by coaxial cable, microwave radio and wire—a wide variety of services. They include private-line telephone, mobile telephone, teletypewriter, and channels for telephotograph, metering, remote control and other signaling. In these fields our research is continuous and our experience nationwide.

In every instance, our recommendations include what we think is right—not too little, not too much. And we provide all of our pipe-line customers with the newest developments in the field of pipe-line communications.

Your Bell Telephone Company will be glad to study your communications problems and needs without charge.

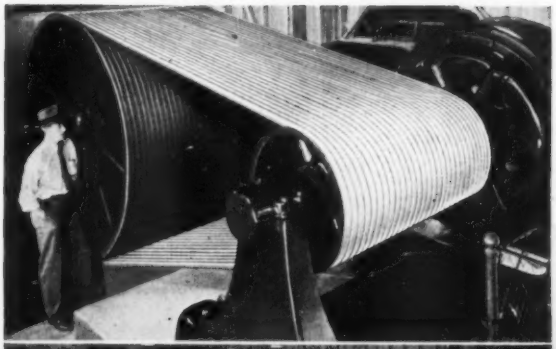
PRIVATE-LINE TELEPHONE

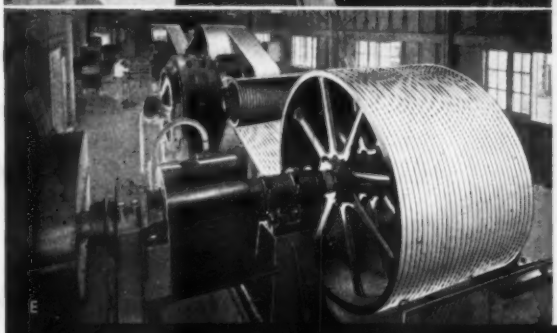
TELETYPEWRITER

MOBILE TELEPHONE

METERING CHANNELS

BELL TELEPHONE SYSTEM





These 750-horsepower and 1000-horsepower Gates Vulco Rope Drives were originally installed in a West Coast butadiene plant in 1942 and ran nearly 5 years until the plant closed down. That plant is now running again—and the **original** Gates Vulco Ropes are once more producing the synthetic rubber so badly needed at this time.

This test shows how the Concave Side gives you a real saving in V-Belt costs

If you are interested in lower operating costs, make this simple test:—

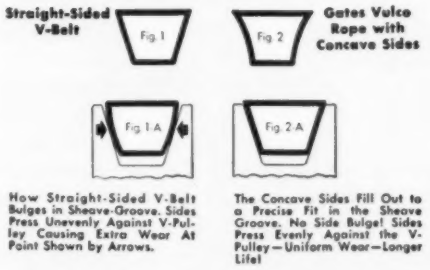
Take *any* V-belt and bend it as it bends in going around a pulley. As the belt bends, grip its sides with your fingers and thumb. You will *feel* the sides of the belt *bulge out!*

This bulging gives a straight-sided V-belt the shape shown in figure 1-A. (See diagrams at right.) Clearly, this shape does not fit the sheave groove. The sides of the bulging belt are forced to press unevenly against the V-pulley—and this concentrates the *wear* along the *middle* of the sides.

But when you bend a V-belt that is built with the *Concave Side*, you find that the sides become perfectly straight—as shown in Figure 2-A. This shape precisely fits the sheave groove.

Because there is *no bulging*, the sides of the Gates Vulco Rope always grip the *full* face of the V-pulley *evenly* and therefore wear *uniformly*—resulting in *longer belt life* and *lower belt costs for you.*

What Happens When a V-Belt Bends



How Straight-Sided V-Belt Bulges in Sheave-Groove. Sides Press Unevenly Against V-Pulley Causing Extra Wear At Point Shown by Arrows.

The Concave Sides Fill Out to a Precise Fit in the Sheave Groove. No Side Bulge! Sides Press Evenly Against the V-Pulley—Uniform Wear—Longer Life!

Only V-belts made by Gates are built with concave sides. Whenever you buy V-belts, be sure you get the V-belt with the Concave Sides—The Gates Vulco Rope!

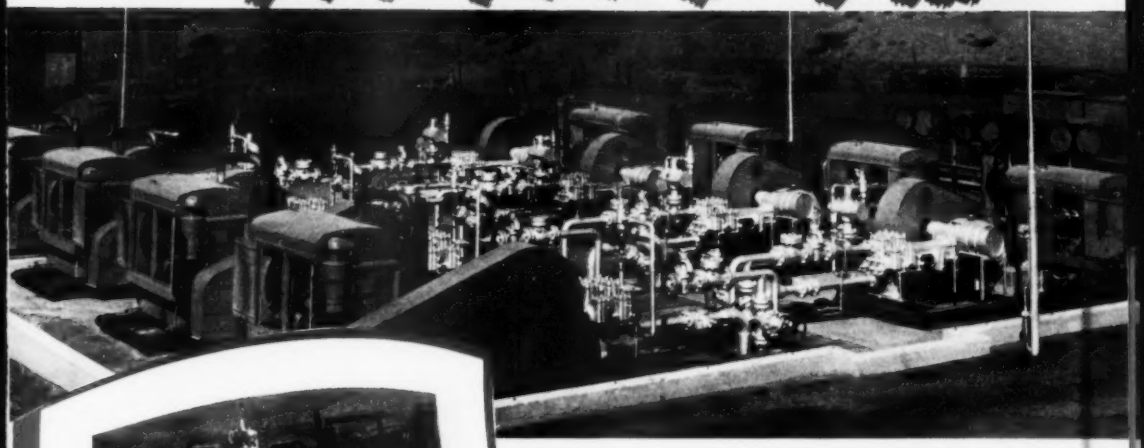
CS-514

Gates
Hose V-Belts
Molded Rubber Goods
for Industry

VULCO ROPE DRIVES
ENGINEERING, OFFICES AND JOBBER STOCKS
IN ALL INDUSTRIAL CENTERS

THE GATES RUBBER COMPANY
DENVER, U. S. A.
The World's Largest Makers of V-Belts

We help to feed RICHFIELD's $7,000,000 "Baby"



BIG pipe lines like Richfield's, once laid, become fixed and permanent installations. It is the feeder lines that provide flexibility and expansibility, and that's where Gaso Pumps come into the picture.

They help to feed main lines by powering the auxiliary lines that reach out into tank farms, field storage and other source-points of oil.

Used singly or in batteries, Gaso Pumps are adaptable to any requirements. Their portability permits transfer when necessary to meet changed conditions. And their performance record assures the kind of service realistic pipe line engineers look for.

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for every oil industry need

These tubes have service "built in"

CHASE ANTIMONIAL ADMIRALTY

(a patented alloy)

Since 1935, millions of pounds of Chase Antimonial Admiralty* tubes have been installed and are serving well. This testifies that they'll give you years of service, too.

These tubes resist dezincification because they have *enough* antimony. And because antimony doesn't affect grain structure, it will not weaken the tube.

Chase Antimonial Admiralty* stays tough . . . stands up under heavy duty. Send coupon for FREE book on Condenser and Heat Exchanger Tubes.

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FREE CHASE BOOK discusses corrosion problems and selection of proper alloy for condenser and heat exchanger tubes.

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40% lower cost in steam hose service

Ordinary "beefed-up" steam hose *failed in tank car cleaning service* after relatively short period of time.

HD Glass Cord Steam Hose specified by the G.T.M.—Goodyear Technical Man—has made 40% saving so far, is still in service.

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GTM-Specified HD GLASS CORD STEAM HOSE

for high-temperature-pressure service

A Heavy-gauge, heat-resistant tube remains soft and flexible at high temperatures

B Glass cord, "flexible-braided" body is non-charring; handles 200 lbs. psi

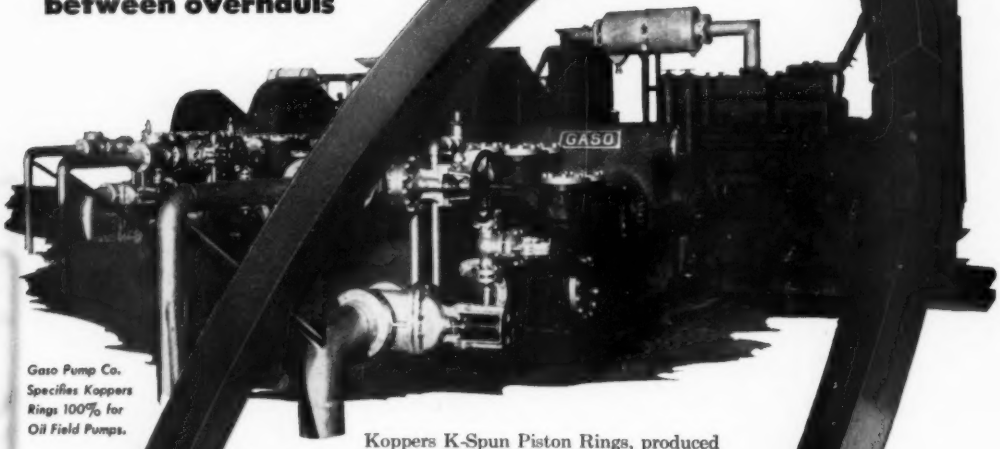
C Tough, sturdy cover provides maximum protection

FOR HOSE, FLAT BELTS, V-BELTS, MOLDED GOODS, PACKING, TANK LINING, RUBBER-COVERED ROLLS built to the world's highest standard of quality, phone your nearest Goodyear Industrial Rubber Products Distributor, or write the G.T.M., Goodyear, Akron 16, Ohio.

GOODYEAR

THE GREATEST NAME IN RUBBER

KOPPERS K-Spun Porous Chrome Rings increase pump service 2½ times between overhauls



Gasco Pump Co. Specifies Koppers Rings 100% for Oil Field Pumps.

Koppers K-Spun Piston Rings, produced by centrifugal casting process, are *100% stronger . . . four times more resistant to combustion shock than ordinary rings! They will not break in installation or for the life of the engine.*

Koppers Porous Chrome* Rings have a porous chrome surface that holds and distributes oil during break-in, quickly wears down to perfectly seated solid chrome that prevents grit and other particles from embedding in the ring surface where they can scratch cylinder walls. Porous Chrome Rings last up to four times as long as other rings, reduce cylinder wear 50% or more.

That's why hundreds of companies like Gasco Pump are reporting amazing savings in equipment and maintenance costs through the use of Koppers Rings. Remember . . . we make rings for *any equipment* that uses piston rings.

*VAN DER HORST PROCESS

If you have a piston ring problem, why not get the *right* answer from us? Write, wire or phone Koppers Co., Inc., Piston Ring Dept., 1557 Hamburg St., Baltimore 3, Md.

KOPPERS

KOPPERS

AMERICAN HAMMERED

PISTON RINGS

SPECIFY: Fast's Couplings . . . Koppers Piston Rings . . . both famous products of the Koppers Co., Inc.

ONLY KOPPERS CAN FURNISH K-SPUN OR POROUS CHROME!

Facts you should know about De Laval turbines!

This turbine has two traffic cops...

that give you double protection against overspeeding. The normal speed governor and overspeed governor are entirely separate. A sticky governor valve can't possibly jeopardize the operation of the overspeed governor and trip.

You can elect the governor that meets your requirements!

We have eight candidates for the job, so take your choice:

Mechanical Shaft governor with smooth-acting, long-wearing "rocking chair" action.

Vertical Mechanical governor geared to shaft for speeds above 4500 rpm.

Hydraulic Governor. Direct acting orifice-type for high speeds and/or wide range of speed adjustment.

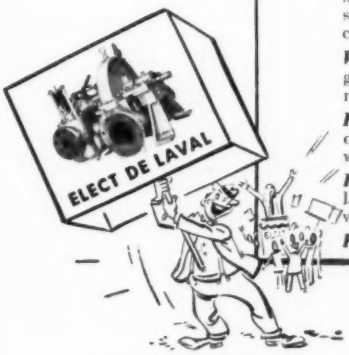
Hydraulic Oil Relay for close regulation or for supplying extra power for valve movement.

Flyweight Oil Relay for close regulation such as encountered in synchronous generator drives.

Pressure Controls for constant pressure or differential pressure regulation of pumps, blowers, etc.

Speed Changers, manual or remote control by electric motor drive.

Auxiliary Trips to shut off steam in the event of low pressure in the lubrication system or undue rise of back pressure. Also can be solenoid operated for remote or manual trip, or for inter-connection with the driven machine or any emergency system.



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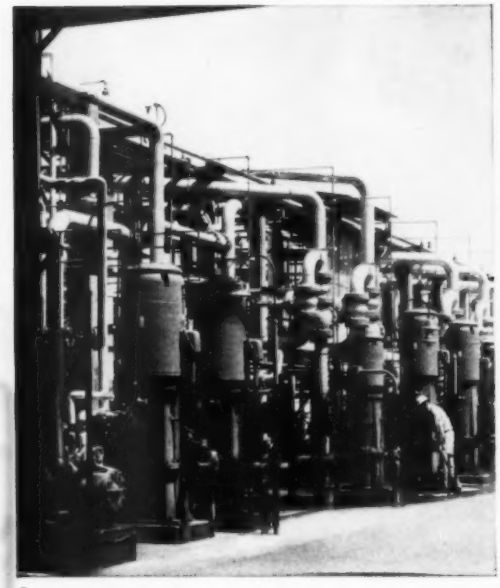
DE LAVAL STEAM TURBINE CO., TRENTON 2, N. J.

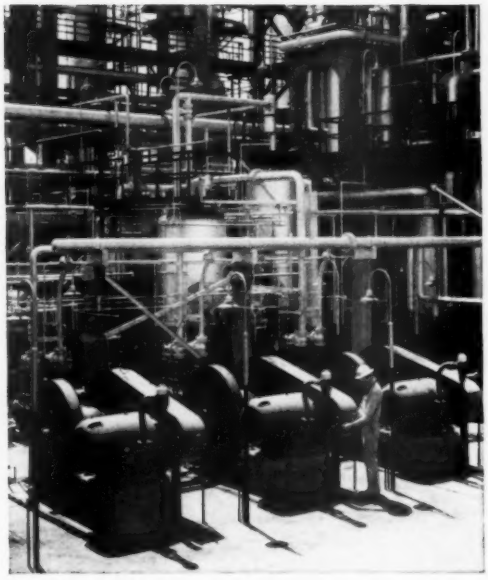
TURBINES • HELICAL GEARS • CENTRIFUGAL BLOWERS AND COMPRESSORS
CENTRIFUGAL PUMPS • WORM GEAR SPEED REDUCERS • IMO OIL PUMPS

50th DE LAVAL Anniversary

A PHOTO-REPORT ON MODERN



1 **ONE FEATURE** of the Oleum refinery is its Duo-Sol extraction unit, used in the manufacture of lubricants. Pumps used in this process are driven by these G-E 2300-volt and 220/440-volt totally enclosed vertical motors rated from 20 hp. to 125 hp. Capacity of the unit is 6000 barrels per day.



2 **COMPRESSOR UNITS** in the Duo-Sol process section are driven by these three G-E 100-hp 2300-volt motors. Because of their corrosion-resistant totally enclosed fan-cooled construction, they are well suited to refinery conditions, regardless of the type of acids, alkalis or solvents encountered.

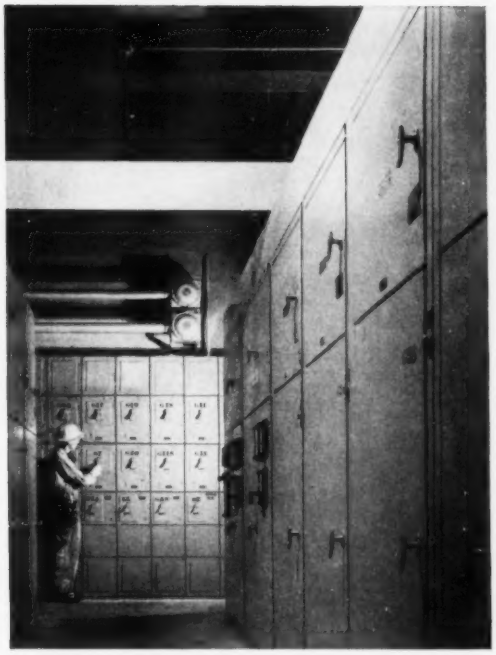
Co-ordinated electrical system helps keep lube-plant yield high!

Engineered G-E drives and power distribution equipment assure needed reliability at Union Oil Company's refinery in Oleum, California.

From 75,000 barrels per day of crude, Union Oil's Oleum refinery processes all types of lubricating oils, plus gasoline, diesel oil, greases, refined wax, and other products. To maintain this diversified output, General Electric power-distribution and drive equipment provides the dependable electric power needed. Co-ordinated from start to finish, this installation is further proof that General Electric can meet all *your* refinery's electrical needs. Ask your G-E representative to give you the facts. General Electric Co., Schenectady 5, N. Y.

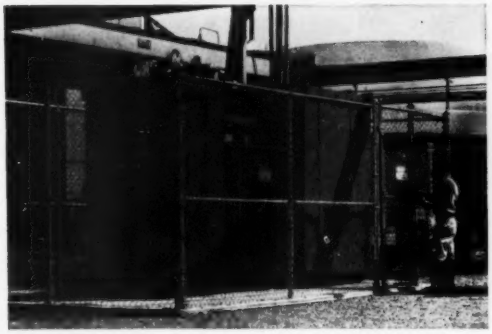
GENERAL ELECTRIC

661-27

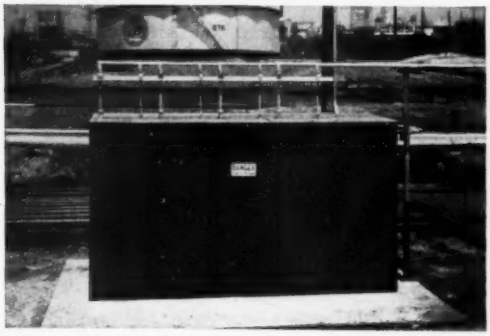


3 PROCESS CONTROL for the Duo-Sol extraction unit is centralized in this pressurized and vapor-proof building to permit the use of standard non-explosion-proof equipment. Shown here are G-E limitamp motor-starters rated up to 350 hp and a Trumbull switchboard for controlling small motors.

4 PROTECTION against complete plant shutdown is part of the job for this incoming line G-E metal-clad switchgear assembly with dual feeders.



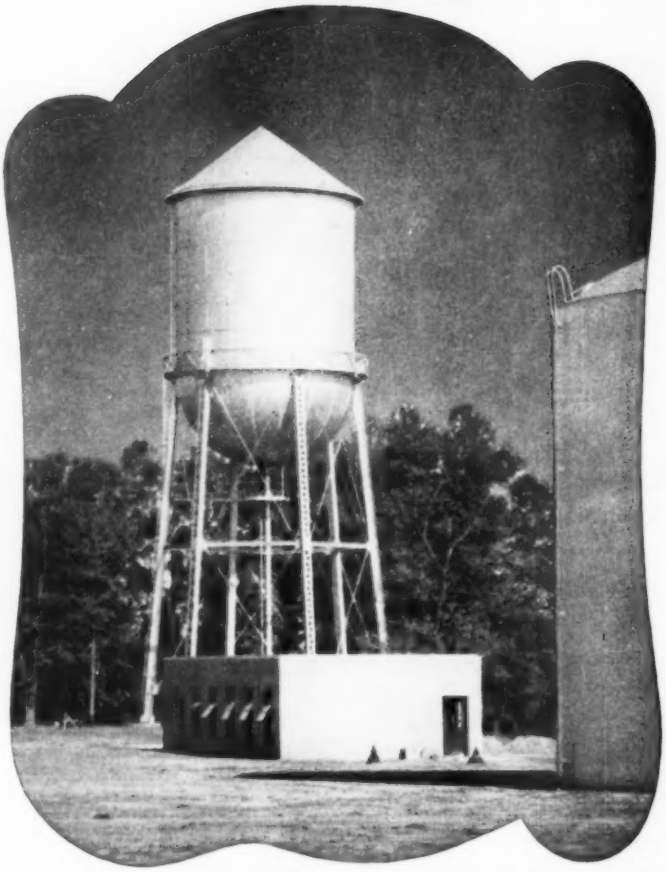
5 FOR LOW-VOLTAGE NEEDS, this G-E outdoor-type 500-kva load-center substation steps down 2400-volt power to 480 volts close to where it's needed, cutting voltage drop and power losses. Complete and co-ordinated, these G-E metal-enclosed units are factory-built for quick installation.



6 CONTROL OF HIGH-VOLTAGE MOTOR and short circuit protection are both provided by this G-E outdoor-type limitamp assembly, serving a transfer pump house. Current-limiting fuses in limitamp controllers cut off current fast when a short occurs, protecting equipment against extensive damage.

Co-ordinated
ELECTRIC EQUIPMENT
for lubricating-oil and solvent extraction

THIS TIME IT'S THE CITY OF NACOGDOCHES, TEXAS



Over in the prosperous pine timber and rich agricultural belt of east Texas, the city of Nacogdoches is looking to the future and planning for further growth. New industries locating at this excellent manufacturing and distribution point were in need of more water. To take care of such needs, municipal officials called in Layne and ordered the installation of another deep well and pump unit, —the third since 1925. With this new unit in operation, Nacogdoches now has a greater water supply capacity than is presently needed.

These three Layne installations extending back for more than a quarter century, have had every opportunity of failing,—or showing proof of their wonderful efficiency, extra long life and absolute dependability.

The answer was as usual with all Layne water supply equipment. Congratulations to Nacogdoches for continued use of the world's finest wells and pumps.

LAYNE & BOWLER, INC.

General Offices, Memphis 8, Tenn.

Designers, manufacturers and installation contractors of high efficiency, long life water supply wells and pumps for cities, industries and irrigation.

THE THREE LAYNE well water supply units installed for Nacogdoches, were designed, built and installed complete by Layne's own engineers, factory and field crews. All installations were under the rigidly controlled and extraordinarily successful Layne method. Each is staged for the exact requirements of the city's pressure specifications.

HELPFUL LITERATURE ON PUMPS

The line of Layne Short Coupled general service pumps is wide enough to include every size, capacity and setting to fulfill any need found in the municipal or industrial field. A new catalog, illustrated with diagrams of practical application of these pumps, will be sent on request.

Layne
WATER SUPPLY
WELLS & PUMPS

MY-LO-JEL

THE IMPROVED DRILLING MUD STARCH

can take the place of protective strings

Quick acting, tough, economical My-Lo-Jel provides positive control of filtration properties.

Magcobar My-Lo-Jel is an improved pregelatinized drilling mud starch in the form of a free flowing powder which can be added directly to the mud through a hopper mixer. My-Lo-Jel provides positive control of the filtration properties of mud even in the presence of salt, anhydrite and other contaminants. It is a blended starch that is especially processed to produce a quick acting, tough and chemically stable plugging agent to inhibit filtration of mud. Thus, it not only lowers water loss, but keeps it low.

My-Lo-Jel is economical and easy to use. So why take chances with tight holes due to filter cake when low water loss muds made with My-Lo-Jel can hold down the cost of drilling by eliminating strings of protective casing, preventing delays due to reaming, hole trouble and fishing jobs.

Look for the Magcobar sign when you need mud!

The well on the left is an example of where two additional strings of protective casing were necessary — one to protect a zone of rock salt and the other to protect a sloughing shale. My-Lo-Jel Mud eliminated the necessity for this extra casing.

Look for this sign **WHEN YOU NEED MUD**

MAGNET COVE BARIUM CORPORATION

Malvern, Arkansas **Houston, Texas**

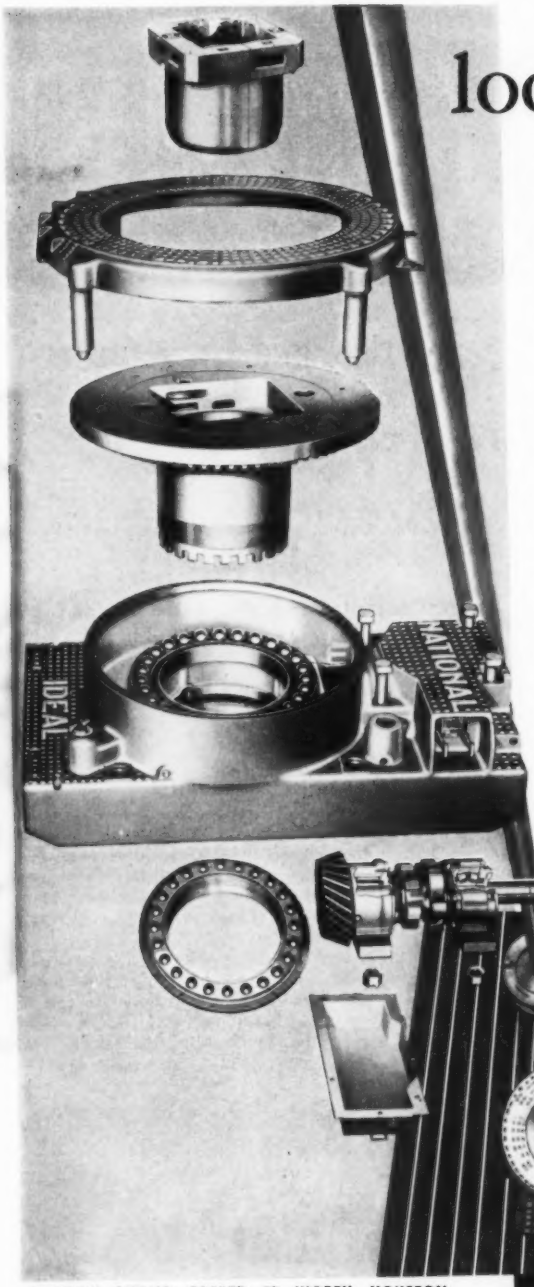
ONE OF THE DRESSER INDUSTRIES

Magcobar

Complete

DRILLING MUD SERVICE

DEALER



look at them

piece by piece

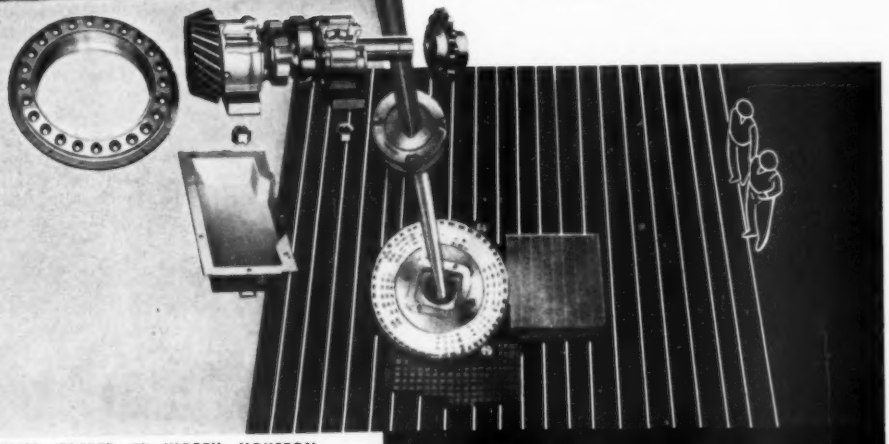
or check the job they're doing

Either way, you'll find IDEAL ROTARIES measure up to your requirements and with plenty of drilling power to spare.

That's because IDEAL ROTARIES, and all other drilling equipment in the "National Blue" line, are built to the standards of work-to-be-done rather than on the basis of first cost. And that's why IDEAL ROTARIES are so economical in the long run.

The IDEAL ROTARY line is complete, too—machines for shallow-hole drilling or high-speed deep-strata operations. Each unit has special construction features for its service range. These are described in detail in bulletins you can obtain by writing The National Supply Company.

In fact, you'll find everything that's new and everything that's standard in drilling equipment at The National Supply Company.



DIVISION OFFICES: CASPER; FT. WORTH; HOUSTON; PITTSBURGH; TULSA; TORRANCE

CANADA: THE NATIONAL SUPPLY COMPANY, LIMITED, ROOM 202, ALBERTA BLOCK, CALGARY, ALBERTA

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THE NATIONAL SUPPLY COMPANY

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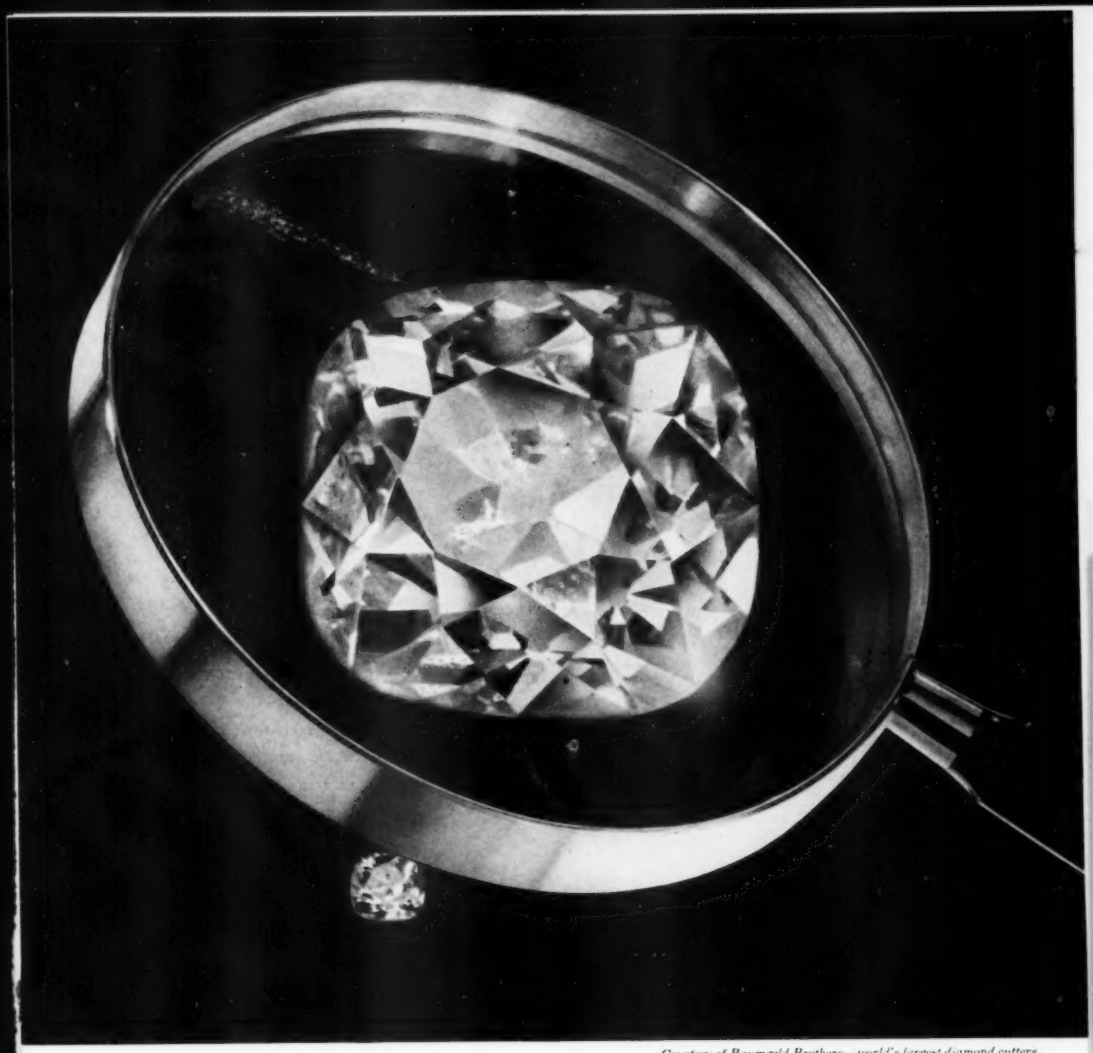
NATIONAL BLUE PRODUCTS

NATIONAL OIL FIELD MACHINERY AND EQUIPMENT • SPANG STEEL PIPE • SUPERIOR & ATLAS ENGINES



Courtesy of Baumgold Brothers—world's largest diamond cutters.

•

Why is complete antiknock service very much like a diamond?

•

WORTH-WHILE antiknock service, like a valuable diamond, has many facets... each of which must be perfectly formed in itself and properly related to the others.

It is Ethyl's twenty-seven years of experience concentrated in the antiknock field which has made possible the painstaking development of each individual facet.

ETHYL
ETHYL CORPORATION

Why is complete antiknock service very much like a diamond? *Continued from preceding page.*

Ethyl service follows every drop of "Ethyl" antiknock fluid all the way from its manufacture to its ultimate consumption in an engine.

"Ethyl" antiknock compound is mixed with gasoline—so we assist refiners in blending operations, offer a wide variety of technical aids and, through national advertising, help them sell leaded gasoline. Since this gasoline is used in engines, a continuous fuel-engine research program is constantly in progress. Finally, because these engines are used in many types of vehicles—cars, trucks, buses, tractors, airplanes—special Ethyl activities have been developed in each specialized field.

Each of these services is a facet on the Ethyl service diamond—important individually, but whose true worth can be measured only in terms of the entire program.

ETHYL CORPORATION
NEW YORK 17, NEW YORK

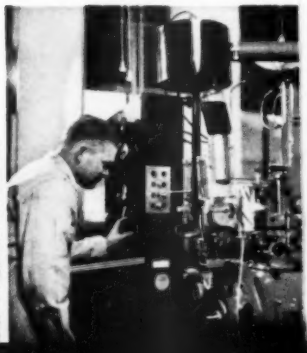
Experience

is the most important ingredient in "Ethyl" antiknock fluid

• RESEARCH
• SALES HELPS

• FARM SERVICE
• ROAD TESTING

• SAFETY SERVICE
• GASOLINE TESTING



GET THE MOTOR that Cleans Itself

DROP MOTOR MAINTENANCE COSTS to a new low by reducing motor cleaning operations. And this new Allis-Chalmers Type APZZ explosion-proof motor makes maintenance costs lower than ever before on this type of motor.

Here's Why

Concealed air passages have been eliminated; dirt cannot build up to cause overheating. Cooling air is blown over the ribbed cast iron frame and bearing housings carrying dirt away with it. How about oily dirt that sticks? It can be wiped or blown off without stopping the motor.

Rigid Construction

The frame is rigid cast iron which not only has high inherent corrosion resistance, but also holds bearings in alignment. Bearings are pre-lubricated at the factory and should need no attention for years. Tapped holes with pipe plugs to permit regreasing and to provide grease relief are standard equipment.

Get All The Facts

The new Allis-Chalmers Type APZZ explosion-proof motor is built in all NEMA standard frame sizes from 224* to 505. Your A-C Authorized Dealer or District Office has complete information. Call today or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for Bulletin 51B6145. A-3399

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.

Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

ALLIS-CHALMERS

*Similar design non-ventilated motors Type APKK, also available in frames 203 to 224 inclusive.

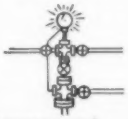
"Inside information" like this → on rock pressure trends

PAYS DIVIDENDS

By keeping continuous, accurate records of significant trends in tubing and casing pressure, Foxboro Pressure Recorders can help you plan oil well operations most efficiently. They give important "inside information" on the life expectancy of wells . . . information that you can use advantageously as a work guide.

Built to withstand all sorts of weather conditions, Foxboro Pressure Recorders are ideally suited to the job. Their compact, die-cast aluminum case is weatherproof. Their sturdy, precision construction assures long service life and lasting accuracy. Typical features that have made them so valuable to oil production are shown below.

Get all the facts about these high-fidelity Tubing and Casing Pressure Recorders. Write for Bulletin 22A. The Foxboro Company, 607 Neponset Ave., Foxboro, Mass., U. S. A.



BRIGHTEST STAR ON THE CHRISTMAS TREE

★ **All-welded, alloy steel helical movement . . .** *functions accurately, without fatigue, even under pulsating pressure.*

★ **Easy range-changing** *without disturbing piping, made possible by union connection at base of helical movement.*

★ **Dual range charts . . .** *show both tubing and casing pressures.*

★ **Two speed chart drives . . .** *available to provide a 7-day speed for normal operation and a 1-day speed for quick close checking.*

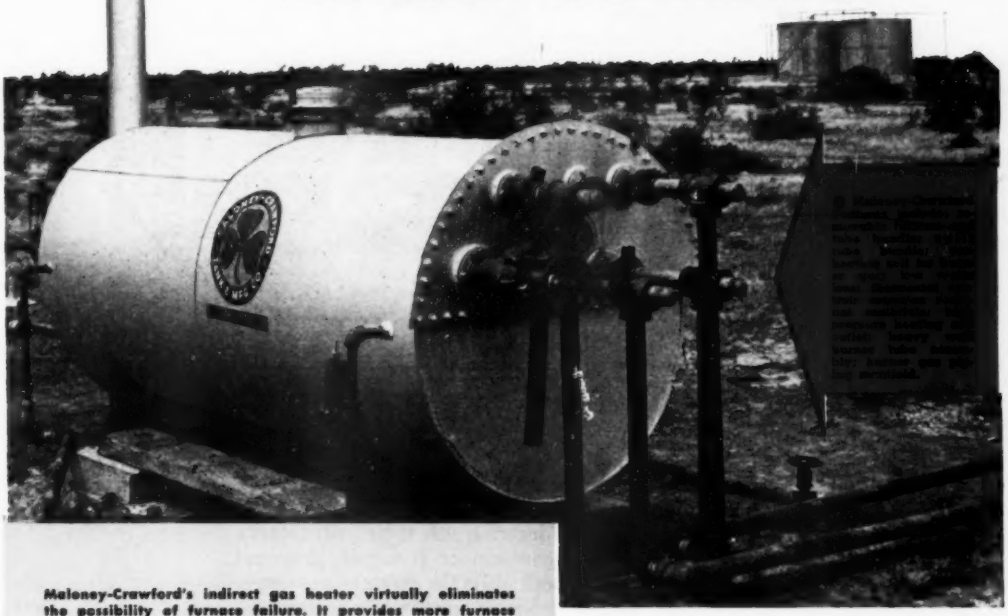
FOXBORO
REG. U. S. PAT. OFF.

INSTRUMENTS FOR OIL PRODUCTION

★ *Eliminate* FURNACE FAILURE
★ *Assure* PROPER TEMPERATURE OF GAS

with a

MALONEY-CRAWFORD
Dependable
INDIRECT GAS HEATER



Maloney-Crawford's indirect gas heater virtually eliminates the possibility of furnace failure. It provides more furnace area, resulting in lower heat transfer per square foot.

A split tube bundle is available, split any way desired. Tube bundles are provided in 2500 lb., 3000 lb., and 6000 lb. working pressures in sizes to meet field requirements. Cast iron bundle is obtainable for heating corrosive oils.

This DEPENDABLE Maloney-Crawford unit is fully portable as a whole and the tube bundle and furnace are removable.

STOCKS AND SERVICE

Artesia, N. M.; Corpus Christi, Tex.; Dallas, Tex.; Edmonton, Canada; Farmington, N. M.; Fort Worth, Tex.; Houston, Tex.; Lafayette, La.; Midland, Tex.; New Orleans, La.; Odessa, Tex.; Oklahoma City, Okla.; Pampa, Tex.; Redwater, Canada; San Angelo, Tex.; Sidney, Nebr.; Snyder, Tex.; Tulsa, Okla.; Wichita Falls, Tex.

PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION MEMBER

MALONEY CRAWFORD

MALONEY-CRAWFORD TANK & MFG. CO.

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for OIL LOANS

in the

MID-CONTINENT

and

ROCKY MOUNTAIN AREAS

NATIONAL BANK OF TULSA

NBT

Oil operators in the Mid-Continent and Rocky Mountain areas can count on NBT for prompt and friendly consideration of their oil finance needs. NBT's oil loan service is sound, practical and of mutual benefit. NBT's officers are experienced in dealing with oil men—they understand and appreciate the problems and financial requirements for exploration—drilling—production—refining and pipe line operations. NBT is giving helpful counsel and financial assistance to oil companies and independent operators. Bring your oil problems to "The Oil Bank of America."

The Oil Bank of America

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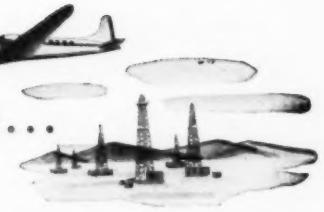
OFFERING COMPLETE BANKING AND TRUST SERVICES

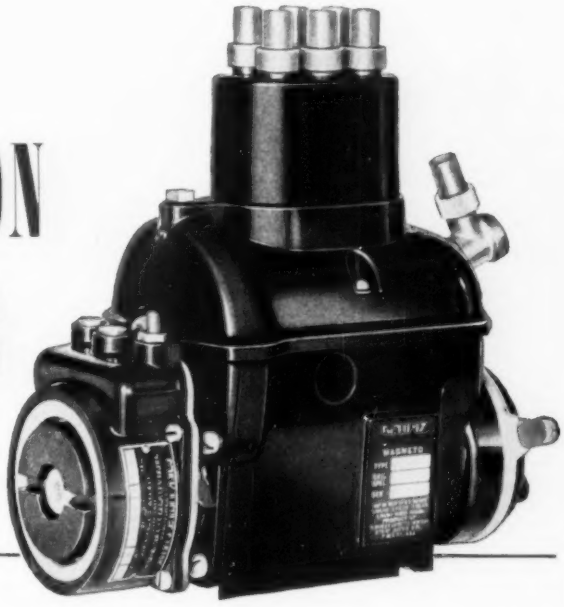
MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

For Sky-High Quality...

and Down-to-Earth Performance...



BENDIX LOW-TENSION MAGNETOS



CONTROL EXPLOSIVE FUMES with FLAME-PROOF VENTILATION!

The Scintilla Magneto Division of the Bendix Aviation Corporation, foremost producer of low tension ignition systems for the aviation industry, now manufactures this same system to fully meet an important safety requirement of the petroleum industry's engine operations. For example, a special ventilating arrangement permits even air laden with explosive fumes to enter the magneto for ventilation without danger of igniting the surrounding air. Kits are also available to convert magnetos now in use to the "flame-proof" ventilation type.

With the Bendix Low-Tension Magneto, spark plug erosion is reduced to a minimum and variable or fixed ignition can be obtained by internal adjustment. The distribution of low tension voltage to the high tension coils is through a series of breaker assemblies, thus eliminating trouble often experienced with a conventional distributor.

For safety and low operating costs be sure to specify Bendix Low Tension for your magneto requirements. Complete data available on request.

- Low Plug Erosion Rate
- Breaker Type Distributor
- Ventilation without Fire Hazard
- Radio Shielding Available
- Variable or Fixed Ignition

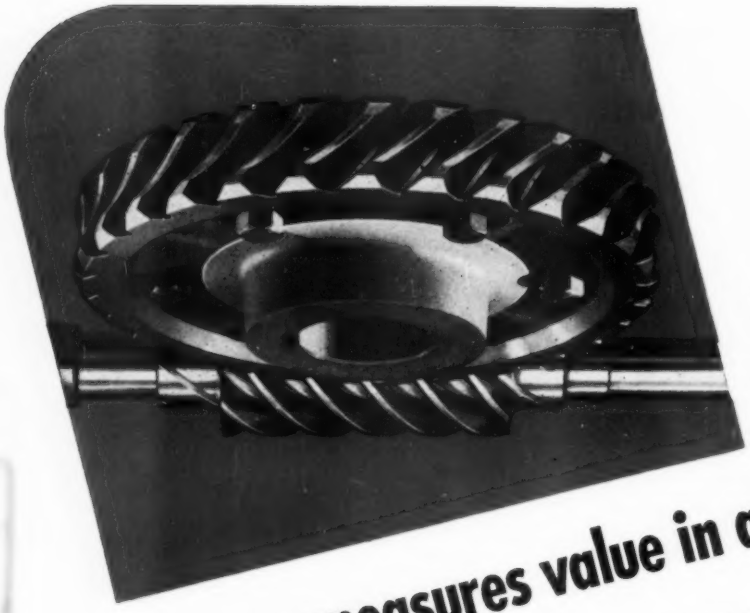
Bendix

SCINTILLA MAGNETO DIVISION OF
SIDNEY, NEW YORK

Bendix AVIATION CORPORATION

Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, New York

FACTORY BRANCH OFFICES:
117 E. Providencia Avenue, Burbank, California • Stephenson Building, 6560 Cass Avenue, Detroit 2, Michigan
Brouwer Building, 176 W. Wisconsin Avenue, Milwaukee, Wisconsin • 582 Market Street, San Francisco 4, California



Whether you want one worm-gear speed reducer or a thousand, a standard drive or a specially designed unit, Cleveland can serve you to your complete satisfaction.

Performance measures value in a Cleveland

FOR nearly 40 years, Cleveland has concentrated on the manufacture of worm-gear drives.

In specializing on a single type of gearing, this Company has emphasized one value above others—dependability—measured by the yardstick of performance on the equipment of its customers.

Thousands of worm-gear drives, made in the earliest years of the Company's operations, are in service today. They do not wear out. They serve in every phase of American industry, drive every type of mechanical equipment where a powerful, trouble-free, right-angle drive is wanted.

For a full showing of the wide variety of sizes and capacities of Cleveland worm-gear drives available, write for new Catalog 201F. The Cleveland Worm and Gear Co., 3286 East 80th St., Cleveland 4, Ohio.

Affiliate: The Farval Corporation, Centralized Systems of Lubrication. In Canada: Peacock Brothers Limited.

In all types of lines... *everywhere*

REPUBLIC ELECTRIC WELD LINE PIPE goes together fast because it is *uniformly round, uniform in diameter, uniform in wall thickness.* It carries pressures safely because of its *uniform high yield strength.* It bends easily because it's made from *high ductility steel. Welds readily* because carbon content is low. *Free from scale* that might clog valves or contaminate products. Comes in *long lengths* that move jobs in bigger strides. *Inspected inside and out* to protect against possible hidden defects.

And, proved dependable by the more than 59,000 miles used for transmission, distribution, collecting and product lines during the past 22 years. Write for literature.

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, New York

Republic Electric Weld Line Pipe is made from flat-rolled steel, both sides of which are inspected. Thus, the surface which becomes the inside wall is free from hidden defects.

Republic
ELECTRIC WELD LINE PIPE

REPUBLIC STEEL

Other Republic Products include Casing and Tubing—Carbon, Alloy and Stainless Steels—Studs, Bolts and Nuts—Heat Exchanger Tubes

P&H DIESEL ENGINES

2-CYCLE

SHOCK LOADS

EVERY 30 SECONDS

That's normal operation for power shovels—the toughest assignment known for diesel engines. It's the service P&H Diesels were designed to take. Years of superior performance, attested by hundreds of users, prove that P&H Diesels can take *any* of your toughest jobs in stride. It's one reason wise users are standardizing on P&H Diesels. There are many other reasons worth learning. For literature, write Diesel Division, Harnischfeger Corporation, Port Washington, Wisconsin.

P&H DIESEL DIVISION
HARNISCHFEGER CORPORATION
PORT WASHINGTON WISCONSIN, U. S. A.

FOR 15 years Tennessee Eastman has manufactured the most effective and efficient gum-inhibiting gasoline additives known to the refining industry.

While the name, TENAMENE, is new to the industry, the products themselves are not. Formerly these inhibitors were sold through another company and under that company's name. Today these additives are available directly from the basic manufacturer.

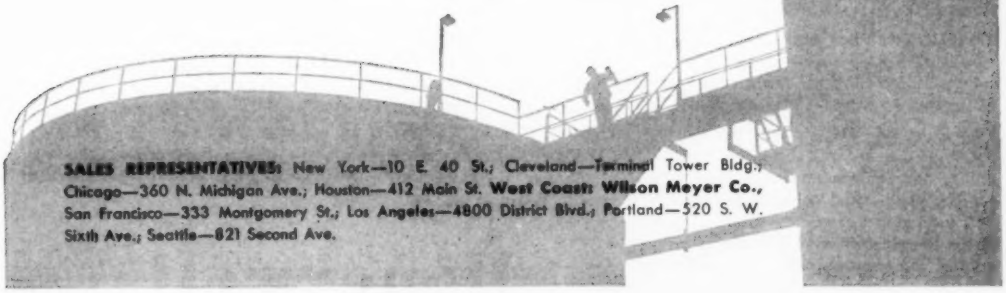
Whether you have been using these Eastman additives under another name or not, you'll find TENAMENE represents the peak in quality and performance. And more than this, you'll enjoy doing business with Tennessee Eastman.

We will be pleased to send you specifications, prices and samples. Write to Tennessee Eastman Company, a division of Eastman Kodak Company, Kingsport, Tennessee, or call our nearest sales representative.

Tenamene

EASTMAN GASOLINE ADDITIVES

TENAMENE 1 (N-butyl p-aminophenol) a gum inhibitor
TENAMENE 2 (di-sec-butyl p-phenylenediamine) a gum inhibitor
TENAMENE 60 (disalicylal propylene di-imine) a copper deactivator
Stocks of Tenamene are carried in Lodi, New Jersey; Houston; Los Angeles; San Francisco; and Kingsport, Tennessee.



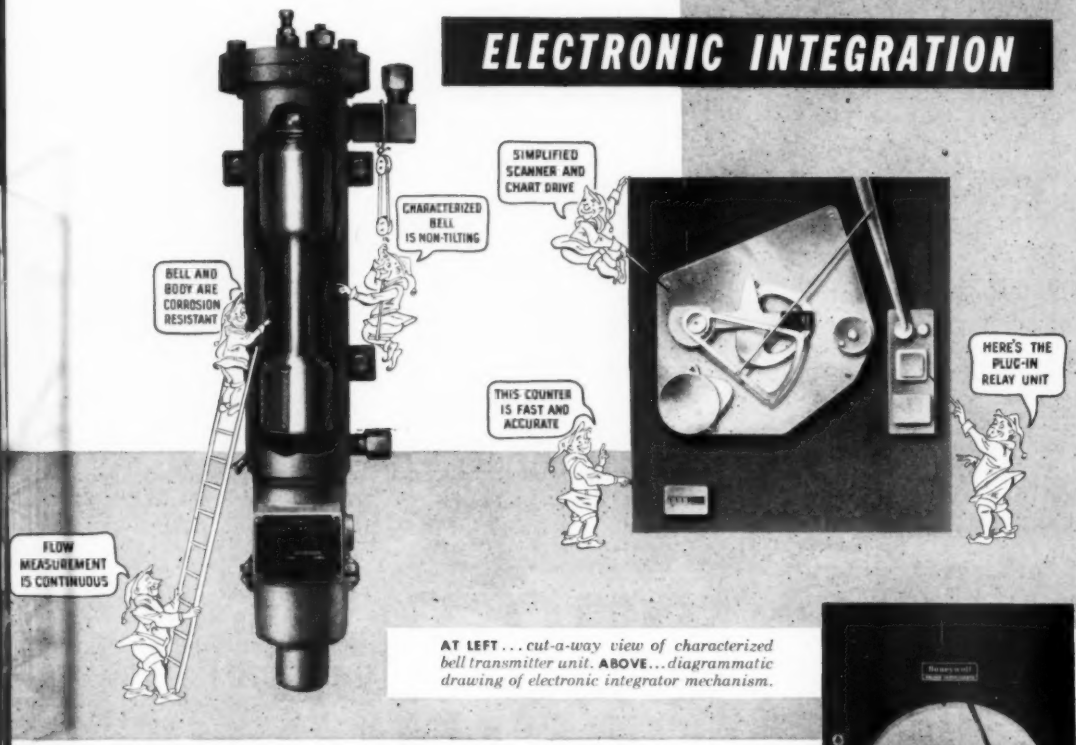
SALES REPRESENTATIVES: New York—10 E. 40 St.; Cleveland—Terminal Tower Bldg.; Chicago—360 N. Michigan Ave.; Houston—412 Main St. **West Coast: Wilson Meyer Co.,** San Francisco—333 Montgomery St.; Los Angeles—4800 District Blvd.; Portland—520 S. W. Sixth Ave.; Seattle—821 Second Ave.

Important Contribution to Flow Measurement and Accounting

The New

Brown Electric Flow Meter *incorporates . . .*

ELECTRONIC INTEGRATION


SIMPLIFIED SCANNER AND CHART DRIVE
CHARACTERIZED BELL IS NON-TILTING
BELL AND BODY ARE CORROSION RESISTANT
HERE'S THE PLUG-IN RELAY UNIT
THIS COUNTER IS FAST AND ACCURATE
FLOW MEASUREMENT IS CONTINUOUS

AT LEFT . . . *cut-a-way view of characterized bell transmitter unit.* **ABOVE** . . . *diagrammatic drawing of electronic integrator mechanism.*

EVENLY-DIVIDED CHART . . . *provides easy readability for all rates of flow. Write for new Bulletin No. 293-1.*

HERE'S another important advancement for power and process instrumentation...continuous flow measurement, with electronic integration!

This Honeywell development eliminates intermittent measurement and slow, complicated totalizing . . . welcome news to process engineers and accountants.

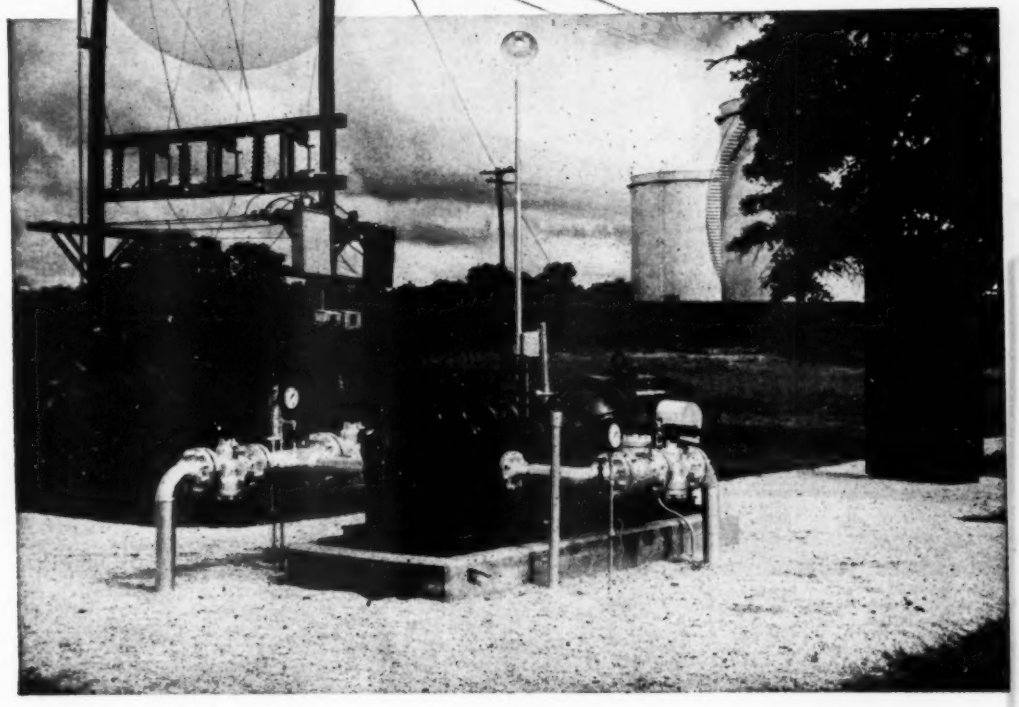
The electronic integrator, consisting of but three major parts, simplifies accessibility and maintenance . . . permits quick checking and calibration. Scanning is rapid and extremely simple. The corrosion resistant meter body is of tubular construction, reducing weight and bulk. Electrical transmission permits remote, continuous recording of flow...and flow is easily totalized under all conditions. The characterized bell is corrosion resistant, too, and is specially designed to eliminate tilting.

Call in our local engineering representative for a discussion of your application.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 4488 Wayne Ave., Philadelphia 44, Pa.

MINNEAPOLIS
Honeywell
Brown Instruments

Electric Power
IS DOING IT FOR LESS!



Yes, *PEP is on the job, giving reliable, economical service. Notice the absence of grease and oil around this modern, neat pipe line pumping unit located at Osage, Oklahoma, and used by a major Pipe Line Company. Your Power Company is now better equipped to render excellent and speedy service. Get the cost facts. Call the Power Engineer of your nearest Utility Electric Power Company. He'll show you how you can save money while enjoying better performance through the use of Purchased Electric Power.

*PEP — Purchased Electric Power

Petroleum Electric Power Association

ORGANIZED IN THE INTEREST OF GREATER SERVICE TO THE PETROLEUM INDUSTRY

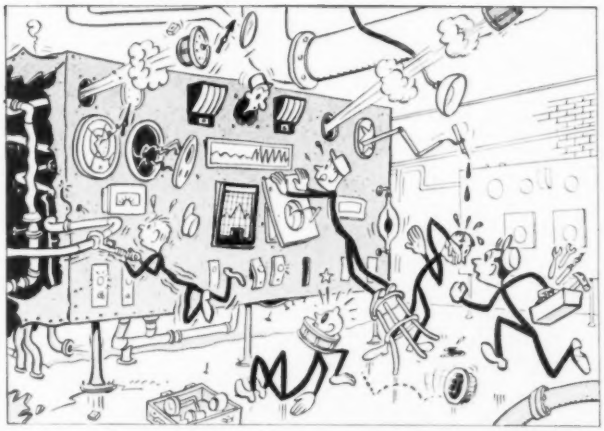
CALL YOUR NEAREST ELECTRIC SERVICE COMPANY FOR MORE FACTS

OR ADDRESS YOUR REQUEST TO P. O. BOX 2771, DALLAS, TEXAS

Bouncing Pipes give a Plant the Jitters

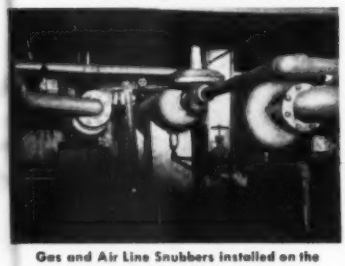
★ FOR SURGE CONTROL IN GAS AND AIR LINES CONSULT BURGESS-MANNING ENGINEERS

Pipes that bounce and vibrate are a nuisance . . . and a plant with the jitters is not operating at top efficiency. To help you solve this problem, Burgess-Manning has developed a Gas and Air Line Snubber which effectively reduces surging . . . practically eliminating the resultant vibration of gas and air lines excited by compressors, blowers, or reciprocating pumps. To aid you in maintaining the operation of your plant at rated capacity, consult Burgess-Manning.

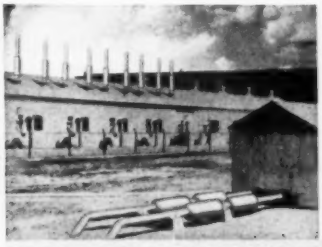


BURGESS-MANNING COMPANY

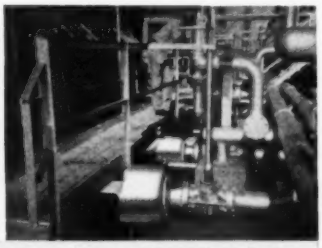
749 East Park Avenue, Libertyville, Illinois
1203 Dragon Street, Dallas, Texas



Gas and Air Line Snubbers installed on the first stage and the high stage of an Ingersoll-Rand Compressor.



Four Burgess-Manning Gas and Air Line Snubbers installed ahead of two meter runs at a Wyoming recycling plant.

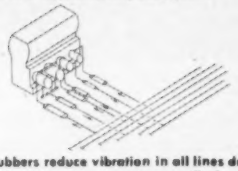


Burgess-Manning Gas and Air Line Snubbers installed on the discharge side of a compressor at a natural gasoline plant.

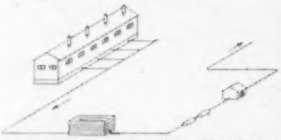
Bulletin 92, "Surge Control."

Booklet, "Bouncing Pipes."

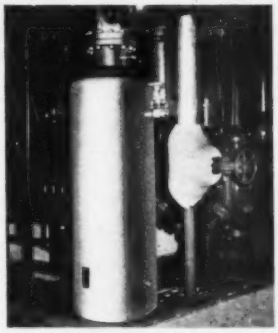
The function of the Burgess-Manning Gas and Air Line Snubber is to prevent the rapid pressure change, which occurs at the compressor or blower, from being transmitted to the pipe line.



Snubbers reduce vibration in all lines due to the intermittent suction or discharge of compressors and blowers.



Gas and Air Line Snubbers smooth the flow of gas without constriction and stop vibration without mechanical damping. Metering fluid flow is greatly simplified.

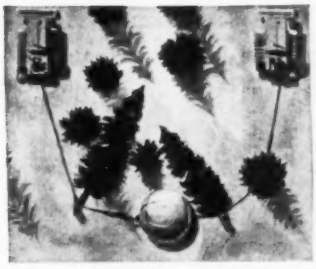


Burgess-Manning Gas and Air Line Snubber installed on discharge side of a compressor at an Oklahoma refinery.

RANGE OF OPERATIONS Burgess-Manning Gas and Air Line Snubbers, custom designed and fabricated around a wide variety of standard parts, are specifically engineered to meet any or all of the following design requirements: all pressures—up to 5,000 psi • all gases and mixtures of gases. These include, among others, hydrogen, butadiene, ammonia, propane, and freon • all weights of gases—molecular weight as low as 7 to as high as 120 • all pipe sizes—as large as 24" diameter pipes • Gas and Air Line Snubbers are designed to meet ASA, ASME, and API-ASME Construction Code requirements. Snubbers can be constructed to conform to the code requirements of any state.

Hungry Horse Highball

1. **Like Paul Bunyan himself,** this great steel ball bounds through the forest, helping to clear the reservoir behind Hungry Horse dam in Montana. The Highball holds strong cables high off the ground, providing leverage that topples trees like match sticks.

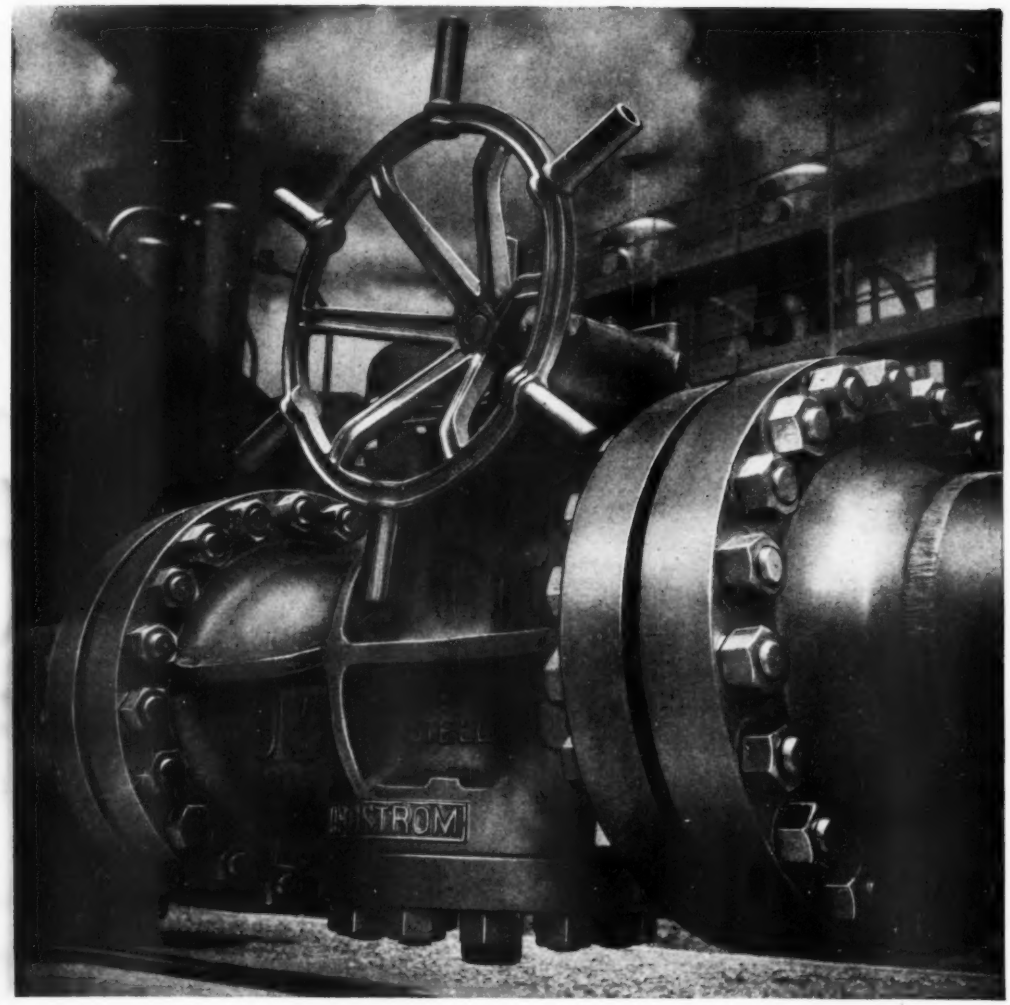


2. **Anchored against stumps,** tractors winch in cables that uproot or snap everything in their way . . . doing a rugged job better than it has ever been done before. For the rugged job of protecting the engine of your car, better than ever before, scientists engineered new Conoco Super Motor Oil.

3. **50,000 Miles — No Wear!** After a punishing 50,000-mile road test, *with proper drains and regular care,* engines lubricated with new Conoco Super Motor Oil showed *no wear of any consequence.* In fact, an average of less than one one-thousandth inch on cylinders and crankshafts! Gasoline mileage for the last 5,000 miles was actually 99.77% as good as for the first 5,000.

Now in its 76th year, Continental Oil Company is still a leader in oil research and a pioneer in oil-perfecting additives, with more than 100 patents on discoveries that lengthen the life of your car.

©1951 **CONTINENTAL OIL COMPANY**



Nordstrom Valves

now *automatically* lubricated with

Trade Mark
ROCKWELL **Hypermatic** LUBRICANT
Pats. Applied for

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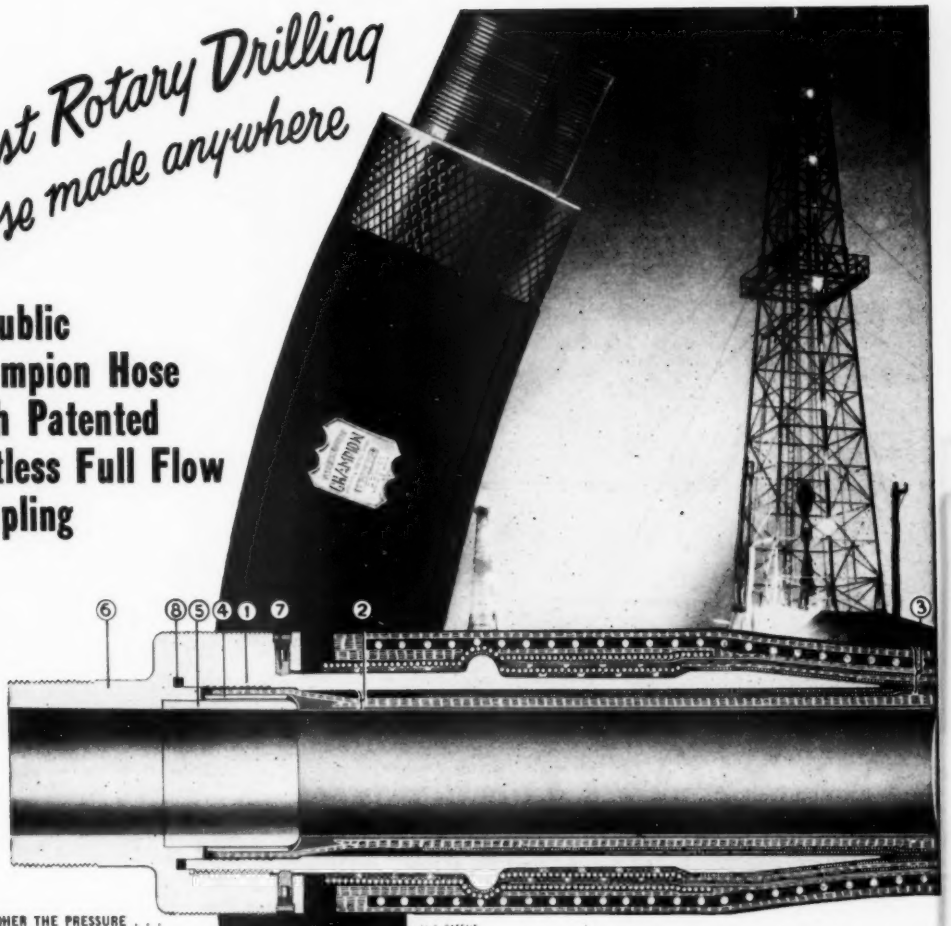
Atlanta, Boston, Chicago, Columbus, Houston, Kansas City, Los Angeles, New York, Pittsburgh, San Francisco, Seattle, Tulsa . . . and leading Supply Houses
Export: Rockwell Manufacturing Co., International Division, 7701 Empire State Bldg., New York 1, N. Y.

Best Rotary Drilling Hose made anywhere

Republic Champion Hose with Patented Boltless Full Flow Coupling



U. S. PATENT No. 2,234,350

THE HIGHER THE PRESSURE . . . THE TIGHTER THE SEAL

In Champion Rotary Drilling Hose the nipple (1) is built in between the metal reinforcements of the hose carcass (2) and (3). The inner reinforced rubber structure (2) is anchored within the nipple and locked into leak-proof engagement by a brass expansion ring (4). This ring receives plenty of protection from the abrasive action of flowing grit by a special steel guard ring (5). As pressure pushes the reinforcing rubber structure (3) against the nipple assembly, a leak-proof union is established, and, ***as the pressure continues to increase, the tighter the seal becomes!*** Note that the cover cap (6) screws into position over the nipple assembly. It fits flush with the external diameter of the hose, leaving no projections to catch on the rigging or interfere with connections. The cap is held in position by submerged set screws and anchor cap seals (7). A rubber gasket (8) seals the joint between cap (6) and end of nipple (1).

● Republic's Champion Rotary Drilling Hose is a strong, flexible hose that's built to withstand severe shock and higher pulsating pressures.

Built-in steel muscles resist pressure, protect the hose against distortion. Oil-resistant Reprene throughout makes the hose practically immune to abrasion or deterioration from oil contact.

Champion Rotary Drilling Hose is available in standard lengths up to 60 feet. Type C Hose designed for 5000 psi test pressure, Type B for 4000 psi and Type A for 3000 psi. See your Republic Distributor or write direct for further information.

INDUSTRIAL RUBBER PRODUCTS BY

REPUBLIC RUBBER DIVISION

Lee Rubber & Tire Corporation

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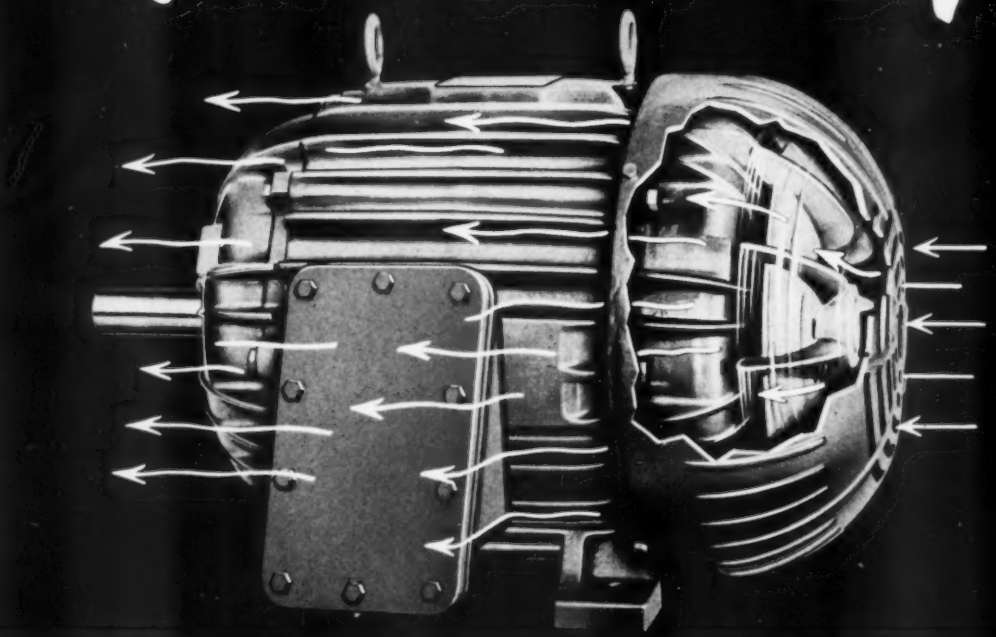
STAYS Cool-STAYS Clean-STAYS Safe!



THE ELLIOTT CROCKER-WHEELER

EXPLOSION-PROOF *Sealedpower* MOTOR

Approved-

Underwriters' Laboratories, Inc.
INSPECTED
ELECTRIC MOTOR FOR HAZARDOUS LOCATION
CLASS ■ GROUP ■ No. ■

CLASS I - GROUP D
CLASS II - GROUP F
CLASS III - GROUP G

■ TEN YEARS AGO the C-W "Sealedpower" motor, with its unique cooling and self-cleaning system, made its bow to American industry. Its immediate and continued popularity has put thousands into successful and satisfactory service.

Now designed with approved explosion-proof enclosure, adding that advantage to the exceptional coolness and cleanliness due to the fan-driven air blast directed along the radial fins, that sweeps away heat, and will not allow dirt or dust to settle.

Here is the ideal motor for refinery and natural gasoline plant drives. Write for the Explosion-proof Sealedpower Bulletin.

HALF CENTURY OF POWER PROGRESS
1901 EC 1951

ELLIOTT COMPANY • ***Crocker-Wheeler Division***
AMPERE, NEW JERSEY
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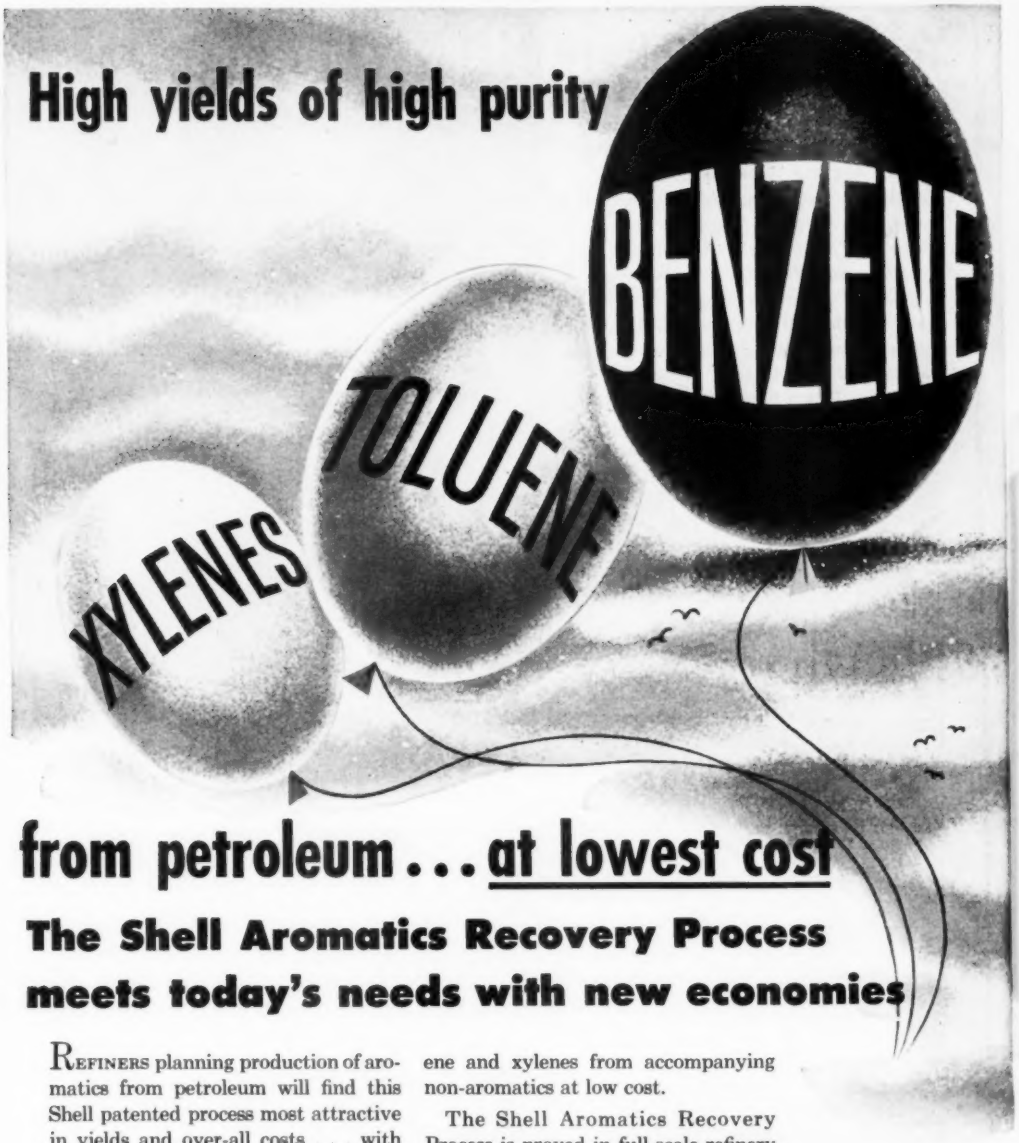
ELLIOTT *Approved* SERVICE SHOPS Cover the Country

CW-38

You're a step ahead with **ELLIOTT**



from petroleum . . . at lowest cost

The Shell Aromatics Recovery Process meets today's needs with new economies

REFINERS planning production of aromatics from petroleum will find this Shell patented process most attractive in yields and over-all costs . . . with lowest commitment of critical construction materials.

The Shell Aromatics Recovery Process assures high-yield, selective separation of high purity benzene, toluene and xylenes from accompanying non-aromatics at low cost.

The Shell Aromatics Recovery Process is proved in full-scale refinery operation. It is available to refiners under a license from the Shell Development Company . . . together with experienced engineering service for its design and operation.

SHELL DEVELOPMENT COMPANY

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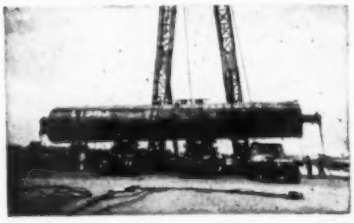
Yours the problem—

Because Harveys have one of the most modern and complete plants in the world, housing up-to-date Rolling, Bending, Pressing and Welding Equipment, operated by an experienced staff, they can supply the answer to even the most complicated plate-work problem. Typical examples of their work for the Oil Industry are shown in the accompanying photographs of Fractionating Columns supplied to the Royal Dutch Shell Group at their Pernis Refinery near Rotterdam.

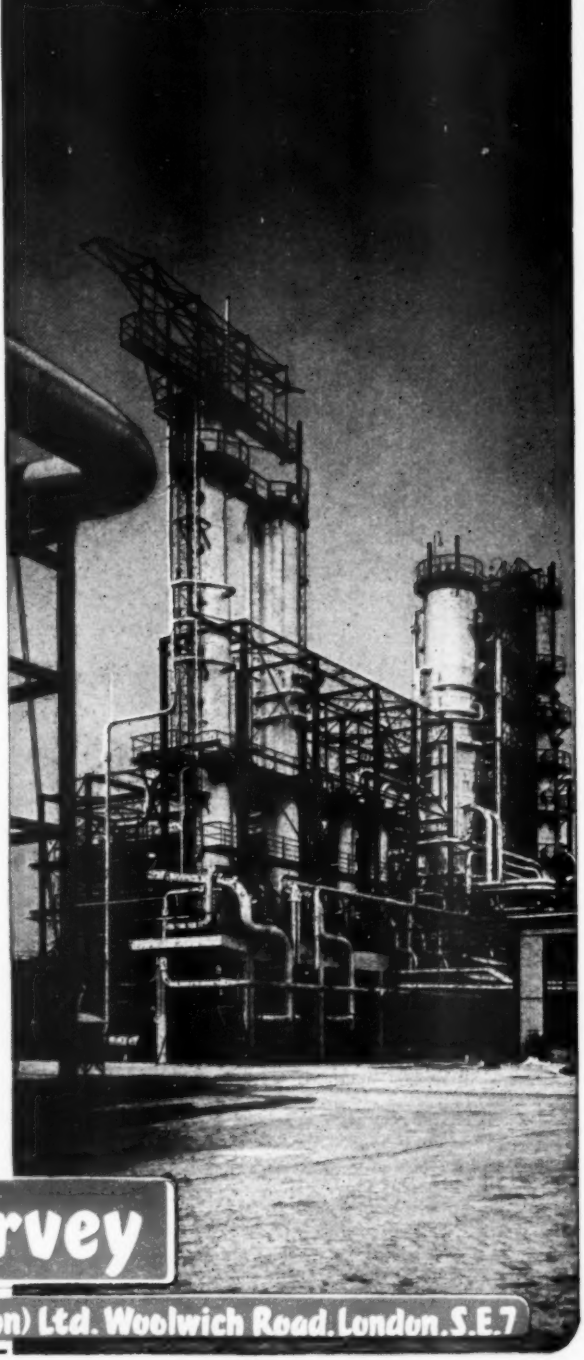
A completely fabricated column is lowered into the Thames near the works—

Towed across the North Sea to Holland—



and lifted from the water at Pernis—quickly to take its part in this new Oil Refinery.

Harveys the answer!



Send for Catalogue OG 750.

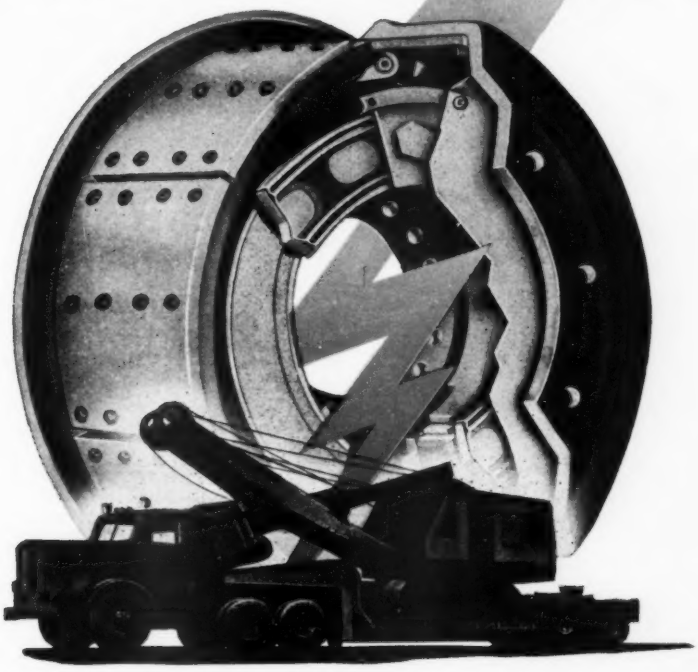
Harvey

G. A. Harvey & Co. (London) Ltd. Woolwich Road. London. S.E.7

Announcing

A NEW WARNER ELECTRIC BRAKE

Expressly for Low-Bed Trailers



EASILY STOPS 16,000 LB. AXLE LOAD ON 15" WHEELS
IDEAL FOR OFF-THE-ROAD LOW-BED OPERATIONS

This new, extra powerful Warner Electric Brake is specially designed for the heavy loads, and unusual operating conditions encountered by low-bed trailers. 12¼" x 5½" size, this new brake incorporates the most advanced features of modern brake engineering — gives you an entirely new extra wide margin of safety. Its power is electric — *allowing faster, smoother and safer braking.* What's more this new brake is job-proven by more than 20 years of successful operation of Warner Electric Brakes by leading tractor-trailer operators everywhere. You can get complete information on this new brake and the entire Warner Electric Brake line by writing WARNER ELECTRIC BRAKE & CLUTCH CO., Dept. OGJ, Beloit, Wisconsin.

Quick Facts on the New Warner Electric Brake for Low-Bed Trailers

1. Only two flexible, small diameter wires lead to each brake — no hoses, diaphragms, pipes or tanks for under trailer mounting.
2. Simple cable connection to tractor makes all necessary electrical contacts.
3. Completely synchronized Warner System matches with hydraulic or air brakes on tractor.
4. "Vari-load" control *pre-sets precise degree of braking power wanted.*
5. Mounts inside 15" wheel — can be used with 7.50-8-25 or 10.00 x 15 tires.

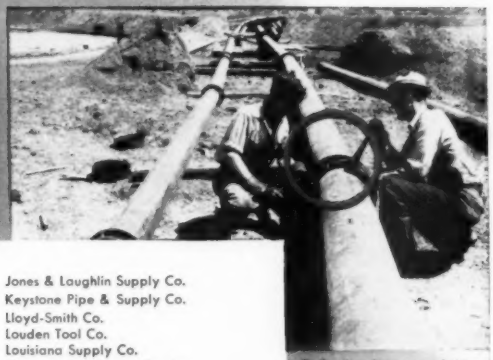
WARNER
THE ORIGINAL AND PROVEN
ELECTRIC BRAKES

SINCE 1927

DRESSERS...QUICK and HANDY

...at your favorite supply store

Well and tank connections made easy with Dresser Style 40 Long Sleeves. They're tight and flexible, even where pipe-ends don't meet.



Gathering lines are laid quickly with Dressers, day or night regardless of weather. When coupled with Dressers, lines can be easily relocated when necessary.

Dresser Style 40 Long Sleeves spans the gap and gives a tight, vibration-proof joint on the "Christmas Tree" below. Factory-built Dressers are ideal for jobs like this . . . and available overnight.

10" Dresser Long Sleeves on rotary drilling rig mend lines. Pipes are joined easily with Dressers, using only a wrench. Vibration stresses are absorbed. Lines stay flexible-tight.

Alamo Iron Works
American Supply Co.
Banks-Miller Supply Co.
Bethlehem Supply Co.
F. W. Black
Bovaird & Co.
Bovaird & Seyfang Mfg. Co.
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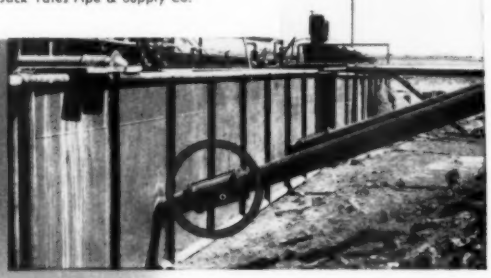
Jack Yates Pipe & Supply Co.



DRESSER COUPLINGS and Repair Products

Dresser Manufacturing Division, 59 Fisher Ave., Bradford, Pa. Warehouses: 1121 Rothwell St., Houston, Texas; 101 S. Bayshore Highway, South San Francisco, California. Sales Offices: New York, Philadelphia, Chicago, Houston, South San Francisco. In Canada: 629 Adelaide St., W., Toronto.

It Takes You There When Other Cars Can't!

The 4-Wheel-Drive Willys Station Wagon, powered by the high-compression *Hurricane* Engine, assures year-around transportation over all kinds of roads. It climbs a 66 per cent grade and goes through mud, sand, snow and roadless country that stops other cars. There is room for six passengers, plus luggage, tools or equipment. The rear seats easily lift out to provide 98 cu. ft. of cargo space. See your Willys dealer for a demonstration of this remarkable car.

4-WHEEL-DRIVE WILLYS STATION WAGON

AIRCO HARDFACE-LIFTING

makes old parts new . . . and new parts better

With today's delays in replacements, dollars offer less and less protection when tools or equipment wear out. No chance of cut-backs, or loss of day-to-day production, if wearing areas are fully protected with Airco Hardfacing Alloys . . . new parts and old stay on the job longer—even at peak production.

No matter what the part, or tool . . . fishtail bits . . . roller bits . . . core heads . . . wall scraper blades . . . drag type drilling bits . . . their life is extended many times by using Airco Tung Tube.

There are more than fifteen types of Airco Hardfacing rods available . . . for protection from every type of wear. Two other alloys widely used in oil field service are Aircoloy 1 and 6, for hardfacing equipment to resist corrosion and temperatures above 700°F. Both alloys have been built to resist abrasion at high temperatures.

Wear is a serious problem in your operations! It will pay you to investigate Airco Hardfacing Alloys. An Airco representative will be glad to give you complete information. Get in touch with your local Airco office today.

a few AIRCO hardfacing alloys

AIRCOLOY® No. 1

A non-ferrous, hardfacing alloy consisting of cobalt, chromium and tungsten . . . excellent corrosion resistance . . . retains hardness and wear resistance even at red heat . . . cold hardness of 53 to 57 on Rockwell "C" scale. May be used wherever heat, abrasion and corrosion are involved. Aircoloy No. 1 is furnished bare for oxyacetylene application and coated for electric arc welding.

AIRCOLOY® No. 6

Excellent corrosion resistance . . . high impact and good wear resistance with some degree of ductility . . . retains hardness and wear resistance at red heat . . . cold hardness of 43 to 47 Rockwell "C". May be used wherever heat, impact, abrasion and corrosion are involved.

AIRCOLITE No. 59

These cast alloy rods are recommended for application wherever abrasion resistance is particularly important. Deposits acquire a high polish in service, and maintain their high hardness at temperatures up to 800° F. Applied either electrically or by gas process. Deposits test from 54-59 on Rockwell "C" scale.

★ ★ ★

Air Reduction supplies Oxygen, Acetylene and other industrial gases . . . Calcium Carbide . . . and a complete line of gas cutting machines, gas welding apparatus and supplies, plus arc welders, electrodes and accessories. Ask us about anything pertaining to gas welding and cutting and arc welding . . . we'll be glad to help you.

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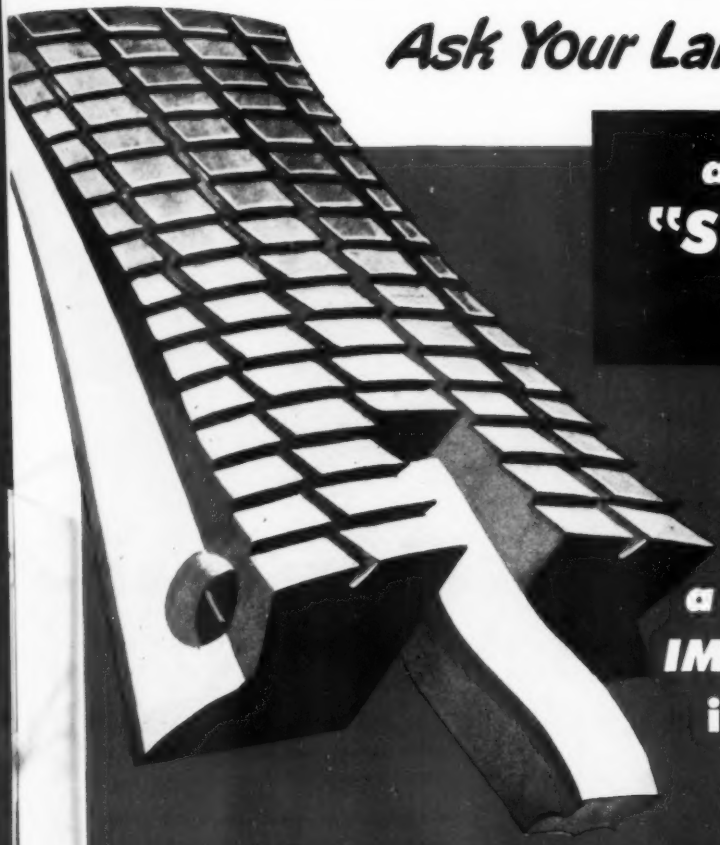
Count off!!
J&L STEEL
THE PARADE OF VALUES IN J&L
BLUE RIBBON INTEGRAL-JOINT DRILL PIPE
ONE
Heat-treated Blue Ribbon Alloy Steel throughout the full length of the drill pipe. Blue Ribbon I-J Drill Pipe gets careful full length heat treatment involving normalizing and temper treatments to refine the grain structure of this patented air hardened steel.
TWO
Special alloy wear bands on the box end of the tool joint section provide maximum resistance to abrasion.
THREE
Forged upsets on the seamless drill pipe (no welds) form a complete integral tool joint.
FOUR
Physical properties of J&L I-J Drill Pipe are uniformly high. Average yield strength —91,000 Psi, Minimum—80,000 Psi; Average tensile strength—116,000 Psi, Minimum—105,000 Psi; Elongation in 2" —Average—25%, Minimum—20%.
FIVE
Only one offset along the inside of the tool joint means considerable reduction in mud turbulence at the joint—an efficiency factor that may be used in reducing mud pressure at pumps or to increase mud velocity at the bit.
SCRAPPY SAYS!
AID DEFENSE
MORE SCRAP TODAY...
MORE STEEL TOMORROW
And these are only a few of the advantages offered by J&L Blue Ribbon Integral-Joint Drill Pipe. Why not contact the J&L representative nearest you today? You'll find knowing all the facts about J&L I-J Drill Pipe efficiency pays in terms of lower drilling costs.
JONES & LAUGHLIN STEEL CORPORATION
PITTSBURGH 30, PENNSYLVANIA

Ask Your Lane-Wells Man



about the "SLYDEZE" SLIP

a great, NEW IMPROVEMENT in PACKERS

...one that you can't see!

To be absolutely accurate, you *can* see it — but only if you want to take a Lane-Wells packer apart. For this new improvement is on the *back* of the slips. It's a new treatment which practically eliminates the slips' sticking, even under high temperatures and heavy pressures.

Because slip-cone friction may be a major cause of stuck packers, Lane-Wells began investigations and tests, two years ago, to find some method of insuring free slip movement under all conditions of packer service. And now it's here! After many tests of many methods, a way was found to apply a coating to all contact surfaces of Lane-Wells famous dovetail slips, to give a permanently lubricated surface that slides easily under all service conditions.

Extensive field tests have demonstrated that Lane-Wells packers with these new treated slips release easily, even after having been set under extreme pressures.

Tomorrow's Tools - Today!

LANE WELLS

AP-405

Los Angeles • Houston • Oklahoma City • Lane-Wells Canadian Co. in Canada • Petro-Tech Service Co. in Venezuela
General Offices, Export Office and Plant • 5610 So. Soto St. • Los Angeles 58, California

They Say—

Another Supply Danger

"Heating oil is a vital material, essential to the health and well-being of the people who use it. Any breakdown of supplies, however temporary or however explainable, will not be overlooked by governmental authorities, especially by those who are ambitious to establish some form of control over the industry.

"It makes no difference that such control, if it were ever exercised, would almost certainly interfere with the industry's efficiency and militate against the very objective it was purportedly trying to reach. Breakdowns in supply, should they occur, will afford such opportunities.

"Every possible measure should be taken to prevent their occurrence. The primary supplier must play his full part in providing the flexibility and the storage to meet unusual conditions. He alone cannot be expected to bear the entire shock of seasonal demand and unpredictable weather. The local reseller and the ultimate consumer must share these burdens with him."

A. L. Nickerson, Socony-Vacuum Oil Co., Inc., addressing Independent Oil Men's Association of New England.

Daily Mail Views Iran

"The Persian situation, so vital to British interests, has been handled as fatuously and feebly as anything in our history. Mr. Morrison has already proved himself to be among the worst of British foreign secretaries. . . .

"His first response to the Persians was that it was 'natural and right that they should have a bigger share in their own industry.' His dear wish, he said, was to see a 'strong, prosperous, and independent Persia.'

"The Persians took him at his word. They began to believe it really was their industry. As their 'bigger share' they raised their demand to 75 per cent of the revenues. To show their independence they ordered control to be taken of the whole show.

"Now Mr. Morrison complains that they have demanded capitulation without discussion. What else did he expect?

"There were three cards he could have played. One would have been to accept the Persian terms right away. A poor card—but still better than having to give in under duress.

"A second card would have been to stand firm and take immediate steps to protect our rights and interests. A third would have been to have got out in 24 hours.

"We believe the second card would have been the winner. But the third—which we do not favor—might also have turned the trick."

Editorial in the Daily Mail, London.

Irreplaceable Force

"Oil which is a mile or so down in the ground does no one any good. Someone must get it out, someone must transport it, someone must refine and process it, someone must get it into the hands of the consumer in the form of gasoline, grease, cosmetics, detergents, and a thousand and one other things.

"All of this must be done with a maximum of efficiency, a minimum of waste—and at the lowest possible cost. Competition, all the way down the line from the well to the corner gas station, sees that it gets done. Nothing can take its place—there's no force to compare it with."

Editorial in the Oil City Derrick.

Shame on Somebody!

"I would like to emphasize that the cases I am about to recount as being noncooperative, represent only a very, very small part of the petroleum industry and that as a whole, the industry has cooperated beautifully with PAD and has been very understanding and helpful in all of the annoying controls and regulations it has been necessary to put into effect. . . .

"PAD requested all operators to file applications for oil country tubular goods for the third quarter, in

EDMONTON
CANADA
CALGARY
U.S.A.
VANCOUVER
VICTORIA
SEATTLE
PORTLAND
SAN FRANCISCO
LOS ANGELES
"YOUR MANAGER"
American dollars are growing in the
WORLD'S NEWEST OIL FIELDS
Another Texas!
That's more than a byword in Alberta, Canada—with production and prospect records following the Lone Star State's path of fame.
Just as in Texas, there are plenty of American dollars at work for progressive operators and investors.
The Alberta Oil Field Offices of The Bank of Toronto offer efficient banking services and information and advice about any phase of Canada's oil industry. Write or call Mr. G. Heinrich, Manager, The Bank of Toronto, Calgary, Alberta, Canada, or I. J. Hutton, Manager, The Bank of Toronto, Edmonton, Alberta, Canada.
THE BANK OF TORONTO
Incorporated 1855

order to provide a basis for the distribution of the 351,000 tons available for the domestic operators.

"The total of all requests as filed amounted to 1,200,000 tons, or about three and a half times the steel available. Had it been possible to grant these requests, there would not have been rigs, manpower, or locations to bury anywhere near these quantities of tubular goods during the third quarter. In other words, a lot of operators simply kited their requests in the hope of securing for themselves a preferential position as regards some other operator. . . .

"There was one operator who filed a request for 100,000 tons of tubular goods for the third quarter, nearly one-third of the total available for all domestic operators, and then had the gall to say that it was impossible for them to state where it was going to be used until they were sure they could get it."

A. P. Frame, assistant deputy administrator, domestic petroleum operations, Petroleum Administration for Defense, addressing Kentucky Oil and Gas Association, Ashland.

For Simpler Writing

"There is a definite need for more clarity and understandability in scientific reports, papers, or even notes and memoranda. The greater the number of people who can comprehend and act on a piece of new information, the greater its effectiveness."

Dr. H. A. Leedy, director, Armour Research Foundation of Illinois Institute of Technology, writing in the Frontier, published by Illinois Institute of Technology.

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CALENDAR

July

Western Petroleum Refiners Association, regional meeting, Broadview Hotel, Wichita, July 19-20.

Wyoming Geological Association, sixth annual field conference, Rawlins, Wyo., July 31-August 3.

August

Wyoming Geological Association, sixth annual field conference, Sinclair, Wyo., August 1-3.

Society of Automotive Engineers, Inc., West Coast meeting, Olympic Hotel, Seattle, August 13-15.

Western Petroleum Refiners Association, regional meeting, Leonard Refineries Auditorium, Alma, Mich., August 17.

American Institute of Electrical Engineers, Pacific general meeting, Multnomah Hotel, Portland, Ore., August 20-23.

Eleventh Annual Appalachian Gas Measurement Short Course, West Virginia University, Morgantown, W. Va., August 27-29.

September

American Chemical Society, 120th national Diamond Jubilee meeting, Hotel Statler, New York City, September 3-7.

Pacific Coast Gas Association, annual convention, Fairmont Hotel, San Francisco, September 4-6.

Michigan Petroleum Association, annual fall convention, Ramona Park Hotel, Harbor Springs, Mich., September 6-7.

International Union of Pure and Applied Chemistry, sixteenth conference, Hotel Statler, New York City, September 8-9.

New York Oil Heating Association, Inc., Hotel Statler, New York City, September 10.

International Congress of Pure and Applied Chemistry, twelfth conference, Hotel Statler, New York City, September 10-13.

Instrument Society of America, Coliseum, Houston, September 10-14.

American Society of Mechanical Engineers, Industrial Instrument and Regulators division, Coliseum, Houston, September 10-14.

National Petroleum Association, Hotel Traymore, Atlantic City, September 12-14.

International Union of Pure and Applied Chemistry, sixteenth conference, Hotel Statler, Washington, D. C., September 14-15.

American Institute of Chemical Engineers, national meeting, Sheraton Hotel, Rochester, N. Y., September 17-19.

Western Petroleum Refiners Association, regional meeting, Hotel Henning, Casper, Wyo., September 20-21.

American Association of Oilwell Drilling Contractors, eleventh annual meeting, Texas Hotel, Fort Worth, September 24-25.

American Society of Mechanical Engineers, sixth petroleum mechanical-engineering conference, Mayo Hotel, Tulsa, September 24-26.

American Society of Mechanical Engineers, fall meeting, Radisson Hotel, Minneapolis, September 25-28.

October

American Institute of Mining and Metallurgical Engineers, petroleum branch, fall meeting, Oklahoma City, October 3-5.

California Natural Gasoline Association, twenty-sixth annual fall meeting, Ambassador Hotel, Los Angeles, October 4-5.

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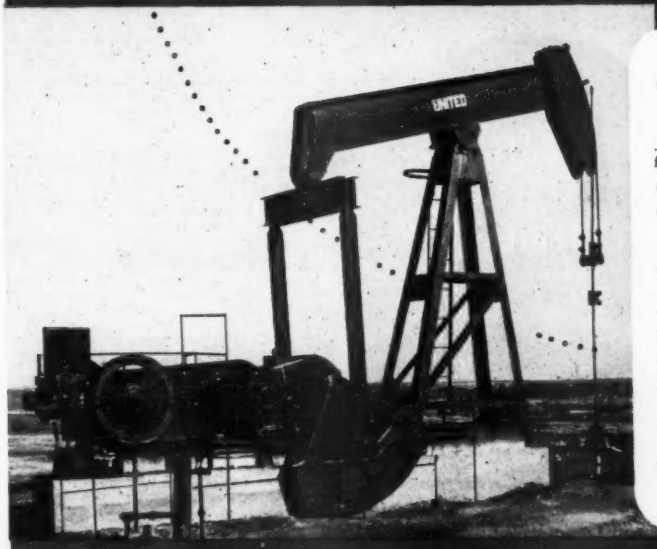

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ciation, annual meeting, Hotel Beaumont, Beaumont, Tex., October 8-9.

American Oil Chemists' Society, fall meeting, Edgewater Beach Hotel, Chicago, October 8-10.

National Safety Council, thirty-ninth national safety congress and exposition, Stevens Hotel, Chicago, October 8-12.

Indiana Independent Petroleum Association, fall convention, Hotel Severin, Indianapolis, October 13-14.

Oil Progress Week, October 14-20.

American Petroleum Credit Association, twenty-seventh annual conference, Adolphus Hotel, Dallas, October 15-17.

American Gas Association, annual convention, Kiel Auditorium, St. Louis, October 15-17.

National Metal Congress and Exposition, American Society for Metals, American Welding Society, American Institute of Mining and Metallurgical Engineers, and Society for Non-Destructive Testing, Hotels Statler, Book-Cadillac, and Detroit-Leland, Detroit, October 15-19.

Institute of Gas Technology, annual meeting, Chicago, October 18.

National Association of Corrosion Engineers, South Central Region, annual meeting, Corpus Christi, Tex., October 18-20.

Independent Petroleum Association of America, Shamrock Hotel, Houston, October 21-23.

American Institute of Electrical Engineers, fall general meeting, Hotel Cleveland, Cleveland, October 22-26.

Society of Automotive Engineers, diesel-engine division, Drake Hotel, Chicago, October 29-30.

Society of Automotive Engineers, fuels and lubricants division, Drake Hotel, Chicago, October 31-November 1.

November

American Petroleum Institute, thirty-first annual meeting, Stevens Hotel and Palmer House, Chicago, November 5-8.

Gulf Coast Association of Geological Societies, first annual meeting, Roosevelt Hotel, New Orleans, November 15-17.

Rocky Mountain Oil and Gas Association, annual meeting, Cosmopolitan Hotel, Denver, November 15-17.

American Society of Mechanical Engineers, annual meeting, Chalfonte-Haddon Hall, Atlantic City, November 25-30.

Society of Exploration Geophysicists, regional meeting, Baker Hotel, Dallas, November 19-20.

Twenty-third Exposition of Chemical Industries, Grand Central Palace, New York City, November 26-December 1.

December

American Institute of Chemical Engineers, annual meeting, Chalfonte-Haddon Hall, Atlantic City, December 2-5.

Chemical Specialties Manufacturers Association, thirty-eighth annual meeting, Mayflower Hotel, Washington, D. C., December 3-4.

New York Oil Heating Association, Inc., Hotel Statler, New York City, December 10.

NOMADS

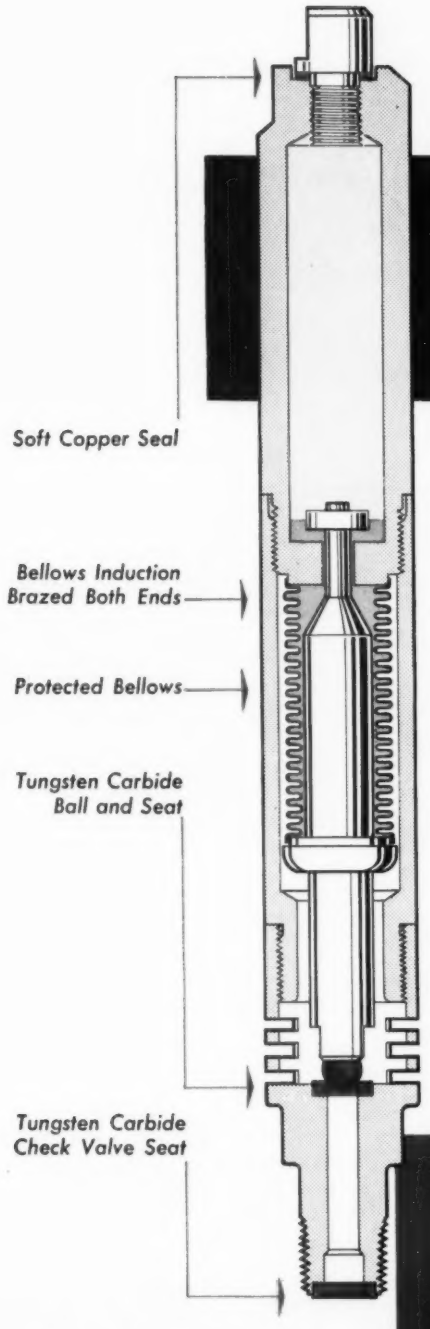
Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas-Fort Worth Nomads, first Monday of each month, Greater Dallas Club.

Houston Nomads, second Monday of each month, Ye Olde College Inn, Houston.

Los Angeles Nomads, second Wednesday of each month, Jonathan Club.

New York Nomads: September 11, luncheon, Downtown Athletic Club; September 18, golf party, Knoll Golf Club, Boonton, N. J.; October 1 and October 29, regular meetings, Louis Sherry's; December 8, Christmas dinner dance, Hotel Pierre.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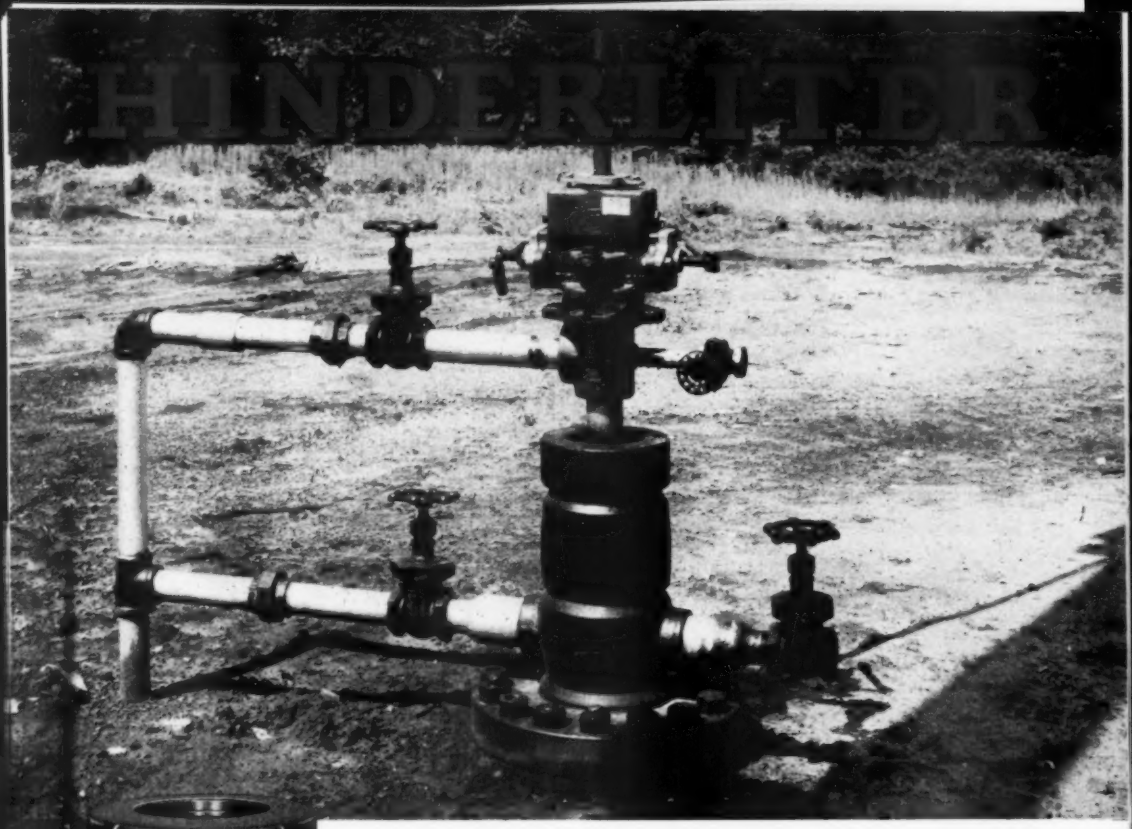
Other patents pending.



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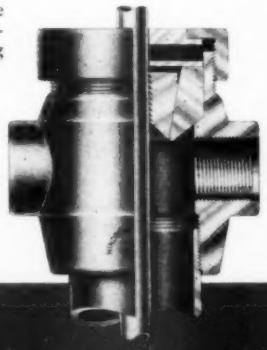

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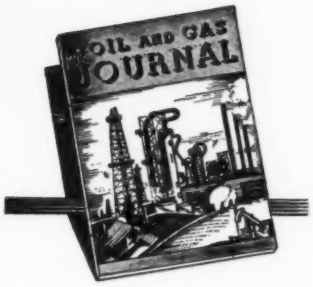

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JOURNALLY Speaking

Letters

THE Journal's mail includes many inquiries from outside the oil industry. We answer them as best we can, feeling that at least we are making a contribution to the industry's program of better public relations.

A Minnesota farm hand thinks he would like to work in a foreign oil field. His letter does not indicate he has the requisites but no harm is done in referring him two or three companies with foreign operations. If not qualified he receives a courteous reply from the companies' personnel departments and he and his friends are satisfied.

Many want to know about investments. Formerly this type came from those who bought stock in the twenties and earlier in the Money Back Oil Co., the Gusher Petroleum, and the like. Now it is usually the heirs, who found the stock certificates following the demise of owners, who hopefully write us. Rarely is there any current information regarding these quick-rich schemes of another generation. Fortunately, SEC regulations assure that Journal editors of 10 or more years from now will not have this type of letter to answer.

Then there is the case where an oil lease has expired and so has the owner. The descendants in Maine, New Jersey, and other points have been told to write us. They are hopeful that the lease is still in effect and that it is located in the center of an oil field which they have read about in a Sunday supplement.

Incidentally we have a rule against staff members trying to pass on the merits or demerits of any of the thousands of current investment opportunities. If an editor ever gets so good that he feels that he is authority on this subject we shall suggest that he is wasting his time writing for a living.

Effective Relations

EFFECTIVE public-relations work by the Oil Industry Information Committee, associations, companies, and individuals is reducing our correspondence outside the industry.

The activities of the Oklahoma-Kansas divisions of the Mid-Continent Oil and Gas Association, headed by Clarel B. Mapes, is a case in point. A. V. Bourque, staff assistant, recently completed a program of calling upon the editors and owners of 312 daily and weekly newspapers and 77 county school superintendents in Oklahoma. He is now engaged in the same type of work in Kansas.

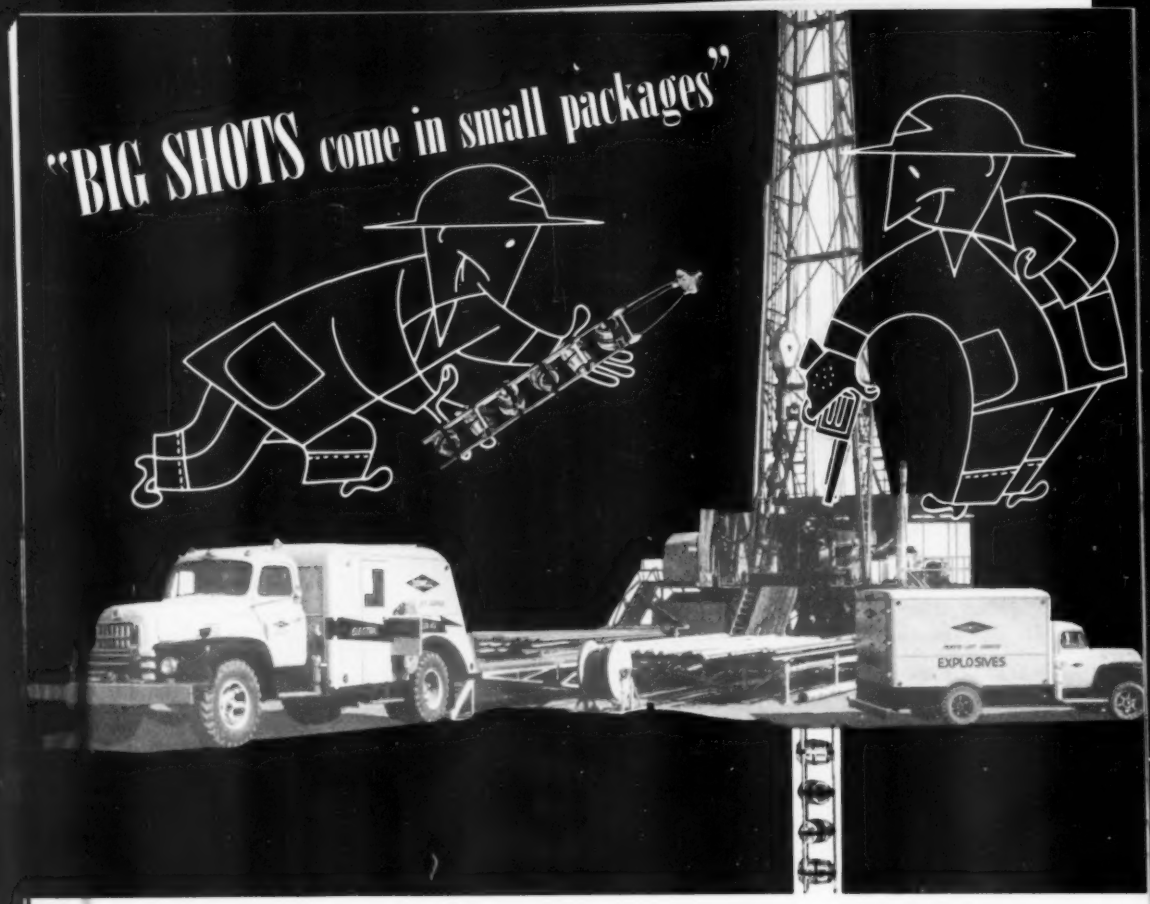
From the editors he invites questions of all kinds concerning the oil industry. You may think that in a state like Oklahoma, the editors would know all about the oil business, but such is not the case. Oil production is actually confined to a small part of the state and that's the rub. An editor wants to know why they haven't found oil in his county. Perhaps a wildcat was drilled and abandoned as dry. The editor is suspicious. There is rumor around that actually the wildcat operator found oil but shut the well in and will open the area for boom development at some future date when the editor and his contemporaries have passed on. The Journal mail often pertains to similar situations.

"A. V." has an answer for this one. The Tulsa files of the association contain many thousands of logs of wildcat tests. He sends the editor the one in question and everybody is satisfied that the test was really dry.

There are literally hundreds of other types of questions from the editors. A. V. has two essentials for this job. He knows the oil business and he likes people. Going back almost to Spindletop he was a member of the staff of Oil Investors' Journal, predecessor of the Journal. He became the first secretary of what is now the Natural Gasoline Association of America in 1921 and later served the Western Petroleum Refiners Association in a similar capacity. His writing ability comes in handy. He has on occasion helped an editor out of a tight spot by preparing a special article on a suggested subject.

With the county superintendents A. V. furthers the educational program which the association has been carrying on many years with books and regular releases.

C. O. Willson.



DEEPER PENETRATION with Dowell Glass Gun in casing perforating or open hole shooting

When you ask for Dowell Perfo-Jet Service, you receive the latest advancements in oil and gas well perforating! Now, Dowell has developed an expendable Glass Gun that allows the use of a larger explosive charge than do other types of guns. This extra detonating power gives you deeper, surer penetration of casing, cement and formation. Comparative "Standard drum tests" through 7" O. D. casing into cement and sand show the following results:

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5" diameter jet perforating gun	8¼"	½"
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FOR OIL INDUSTRY CHEMICAL SERVICE

The OIL AND GAS JOURNAL

July 12, 1951

VOL. 50, NO. 10

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To have been the pioneer in developing and marketing floating equipment means little unless the wealth of knowledge acquired through years has been utilized to attain the position of "leadership" today.—By studying the performance of Baker Floating Equipment in cementing thousands of wells; by continuous "pioneering" as new materials could be incorporated into proven, as well as experimental designs, Baker always has maintained the lead, and is today unquestionably "First" in the Field.

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This exclusive Baker development is widely used by operators who are willing to pay slightly more for this added assurance of success, especially when bridges are present in the hole. The baffled side ports in Baker WHIRLER Equipment direct the fluid at an angle against the walls of the hole, and this action combines with the hydraulicking effect of the fluid through the bottom of the shoe to remove bridges and permit safe landing of the casing. In addition, the well is conditioned to permit bonding of the slurry with the formation.

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Here is a "First" possible only because you (and thousands of other operators) have been quick to recognize tools and methods which *provide dependable performance*. It is both a challenge and an inspiration to work with men who *insist upon results*—a challenge to supply their present needs, and an inspiration to meet their demands of tomorrow. Baker will always be ready!

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Compulsory Pooling

Nobody likes compulsion, oil men least of all. Yet many oil companies are now advocating state legislation to compel unit operation of oil pools for pressure maintenance in their early stages of operation as well as for secondary recovery.

Scientific knowledge of reservoir engineering and 20 years of experience with voluntary unitization have demonstrated that most oil pools will yield far more oil, sometimes two or three times as much, under proper unitization than could be recovered by producing each lease separately. This makes unit operation an important factor in conservation, but the motive behind every unit plan is more profit for the producers.

In spite of the profit possibilities, many unit plans fail of adoption because owners of a small minority of working or royalty interest refuse to enter a voluntary agreement. Hence the support for compulsion.

The recalcitrants have various motives—a sense of individual ownership which prefers tangible property to an undivided interest; rugged individualism which views cooperation as socialistic; misunderstanding of the technical or economic aspects of the plan; reluctance to trade a certain income for a promise of an increase later; distrust of major companies.

It is also alleged at times that some who block voluntary unit plans are motivated by selfishness, attempting to capitalize on their nuisance value or to get a disproportionate share of the benefits.

The question before the industry and the legislatures of several oil-producing states is whether such objections should be permitted to block unitization of an oil pool. If the only consideration were the profit of those desiring unit operation, the proper course would be for the legislatures to keep hands off and let the promoters haggle with the holdouts.

But the real stake is the prospective increase in ultimate recovery of an irreplaceable natural resource, and this is a proper matter for public concern. Unit agreements should be voluntary, but when a small minority thwarts the majority desires in spite of fair and equitable offers of participation, the force of law becomes necessary.

A properly drawn compulsory-unitization law is no more socialistic or restrictive of private rights than a city zoning ordinance. It should require initiation and support of a plan by a substantial majority of both working and royalty interests and provide for review of engineering, economic, and equity aspects by the state regulatory body.

A statute fulfilling these requirements is a logical step in the succession of conservation measures. Oklahoma and Arkansas have such laws, and Oklahoma's has been upheld in the courts. The time has come for other states to take similar action.

THIS WEEK

INTERNATIONAL—British decide to stay in Iran if possible, keep products output at sufficient rate to supply Iranian needs. . . . Abadan refinery this week down to about 16 per cent of capacity. . . . Iran tells President Truman his most recent appeal for calm approach to problem is "a little late." . . . Pilferage increasing at Abadan, interference with British personnel growing. . . . Iranians talk of cutting price of crude oil upon taking over A.I.O.C. operations. . . .

TRENDS—Weekly data indicate a new all-time record for refinery operations in June with runs averaging 6,579,000 bbl. daily. . . . This represents an increase of 924,000 bbl. daily over June 1950. . . . Gasoline production averaged 3,097,000 bbl. daily compared with 2,748,000 bbl. daily last year. . . .

ACTIVITY—Crude production averaged 6,093,700 bbl. daily for week ended July 7, down 10,300 bbl. daily. . . . ¶Total completions dropped to 837 wells from 924 a week earlier. . . . Wildcat completions totaled 200 compared with 232 for previous week and 158 for same week last year. . . . ¶Rotary rigs operating in United States on July 2 increased 20 rigs to 2,572 for another new record. . . .

NATURAL GAS—PAD issues tentative order prohibiting natural-gas companies from accepting new customers. . . . Order expected to become effective next month. . . . ¶Kansas Corporation Commission orders return of $2,125,000 in bonds to 11 gas purchasers after finding them substantially in compliance with Hugoton field minimum-price order. . . . ¶Natural Gas Storage Co. of Illinois seeks permission to develop underground natural-gas project in Kankakee County, Illinois. . . .

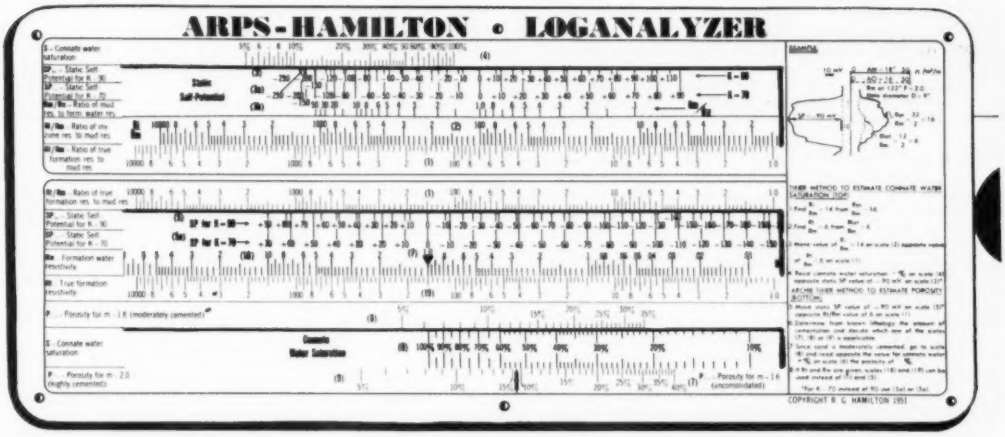
DRILLING—Use of gas as mud substitute cuts drilling time, saves money in completing six wells in San Juan basin. . . . Design of rig to use gas all the way down being considered. . . . ¶New slide rule makes possible quick calculation of complex formulas, permitting detailed interpretation of electric-log data during drilling operation. . . .

PIPE LINES—Service Pipe Line Co. awards contracts for its new 123-mile, 10-in. crude line from Haskell County to Bowie, Tex., to Smith Contracting and O. R. Burden Construction Corp. . . . ¶Gulf companies to construct 43-mile, 6-in. crude line to serve Spraberry oil-producing area in West Texas. . . . ¶El Paso Natural's rights to complete line over federal lands is upheld by U. S. Court of Appeals. . . .

INDUSTRY—California Oil Producers Agency opens battle against crude, products lines from Texas, publishes forecast showing West Coast has oil surplus over civilian needs, can further increase output. . . . Quaker State signs contract for purchase of 25,000 acres containing 3,000 wells in Pennsylvania. . . . Richfield plans appeal on federal District Court ruling its exclusive-dealer contracts violate antitrust laws. . . .

REFINING—Output of lubricating oils now at record level. . . . Some talk heard of expansion of facilities, but most consider future too uncertain to make definite plans. . . . ¶Johnson Oil Refining Co. completes construction of new 1,800-bbl. Platforming unit at its Cleveland, Okla., refinery. . . . ¶Union Oil Co. rations premium gasoline to dealers. . . . Blames shortage of tetraethyl lead, caused by limited supply and increasing demand. . . .

DISAPPEARING PLUMES.—The smoke and steam was disappearing this week from the world's largest refinery, Anglo-Iranian Oil Co.'s 500,000-bbl. processing center at Abadan, Iran. The huge catalytic cracking unit was to be shut down this week, along with several other processing units, leaving the refinery operating at about 16 per cent of capacity. Operations have been slowing down since tanker liftings of products was halted a couple of weeks ago, after Iran issued an order directing tanker captains to sign receipts showing that payment was due to the newly created government oil company. This view is of but a portion of the sprawling refinery.



***NEW ELECTRIC-LOG SLIDE RULE.**—This is the front face of a new device which quickly solves complicated electric-log formulas in many cases to yield percentage porosity, connate-water saturation, oil or gas saturation, and sometimes permeability. Printed by special permission. Copyright 1951, R. G. Hamilton.*

New Log Interpreter

Slide rule makes short work of complicated Archie, Tixier equations for finding porosity, permeability, saturation

Kenneth B. Barnes

TULSA.—A new slide rule invented here makes quick work of calculating complicated electric-log data for oil and gas wells or dry holes—before actual well completion.

The new electric-log "slip stick" calculator is the first of its kind in a specialized technical field now well known for its multiplicity of electronic formulas.

Electric logs of wells in recent years, through the application of quantitative methods, have yielded important reservoir data to the petroleum engineer and geologist—percentage porosity, connate-water saturation, oil or gas saturation, and sometimes permeability.

While these factors cannot always be worked out for every well log, nor are the results accurate in every case, the obtaining of reservoir data from the electric-log formula computations has been considered an extremely forward technical step. But the calculations heretofore were pretty tedious for even most expert electric-log analysts.

"Log analyzer."—Physically the new device is a fairly wide "slip stick" with front and back faces carrying a number of logarithmic and linear scales. Size is 3⅞ by 9 in., and the rule itself is built of Vinylite plastic. Some of the scale numbers are printed in black, others in red, for contrast and easy reading.

Basically, the slide rule has been built up mathematically from the pioneering electric-log equations developed several years ago by G. E. Archie, of Shell Oil Co. *(A.I.M.E. Tech. Pub. 1422 and A.A.P.G. Bull., Vol. 31, No. 2)*, and others more recently by M. P. Tixier, of Schlumberger Well Surveying Corp. *(The Oil and Gas Journal, June 16, 1949, and June 23, 1949)*. Altogether the slide rule will permit eight separate calculations on its front face, and two from the scales on its back face.

Briefly, the solution of quantitative electric log-reservoir relationships are as follows for the front face of the slide rule:

Connate water.—1. Top slide—Connate water by the Tixier method: Starting with the true formation resistivity beyond the invaded zone, as obtained from a long normal or lateral curve, and placing this by a simple movement of the top slide opposite the proper value of the invaded zone resistivity obtained from the short normal curve, the connate-water percentage can be read directly opposite the proper value of the static self potential.

2. Top slide—Connate water saturation by Tixier method: The same computation as before can be made with the top slide if the salinity or the resistivity of the connate water and mud are known, instead of the S. P. value.

Porosity.—3. Bottom slide—Porosity by Tixier method: Starting again with a ratio of true formation resistivity to mud resistivity and placing, through a single movement of the bottom slide, the proper value of this ratio opposite the self potential, porosity in per cent can be read directly on one of the bottom scales.

4. Bottom slide—Porosity: The same computation of porosity as above can be made with the bottom slide without the knowledge of self potential or mud resistivity, when the true formation resistivity and the water salinity or resistivity are known instead.

5. Bottom slide—Porosity of a water sand: Where the connate-water saturation can be assumed to be 100 per cent, porosity can be computed directly with less data than in (4).

6. Bottom slide—Porosity of water sand: Porosity can also be computed directly with the bottom slide when the resistivity of a water-bearing sand and the salinity or resistivity of its water are known.

Formation factor. 7. Bottom slide—Formation factor from porosity and cementation factor: For a given porosity and cementation factor the formation factor can be read directly as the true resistivity of a 100 per cent water-saturated sand with connate water of 1 ohmmeter resistivity.

8. Bottom slide—Resistivity of water-bearing section of a sand when connate water salinity is known: By carrying the method of computation of (7) one step further, the Ro value (for use in the Archie calculation of

connate water) can be determined quickly for a sand with known porosity and cementation factor.

The back face permits two other quick computations:

1. Top slide—Connate water saturation, by the Archie method from Ro to Rt.

2. Bottom slide—Average permeability, from the resistivity gradient by the Tixier method.

Development background. — The idea for such a quick calculator was discussed in an electric-log-interpretation school held in Tulsa.

John J. Arps, manager of production research for British-American Oil Producing Co., quickly conceived of a suitable design and executed the construction of the first Log-analyzer.

Arps used this for some time before modifications were introduced, and deserves full credit for the original design. Dr. Robert G. Hamilton, electric-log consultant, later assisted in further development. Valuable suggestions were offered by logging-company personnel.

Limitations.—Both Arps and Hamilton are quick to caution that their new reservoir device cannot give all possible results from every electric log to which the slide rule is applied. Moreover, they point out that the calculator obviously should be used only with full knowledge of the physical-electro principles and formulas involved.

Nevertheless, the two say that the old days of such loose talk as "the log shows a kick on the left side and there's a bump on the resistivity side" will now even faster be replaced with precise quantitative interpretations.

The two Tulsa engineers are pleased with the initial reception, which involves orders running for more than a thousand rules. Hamilton's firm is marketing the rule, which is priced at $7.50, with general instructions printed on the case.

Gas Speeds Drilling

Use as circulating fluid cuts cost, time in six wells to date; design of rigs using gas all the way considered

FARMINGTON, N. M.—Use of natural gas as a circulating medium in rotary drilling-in operations has proven successful in Kutz Canyon gas field near this town in San Juan Basin.

This method has been used effectively in drilling six wells to date. Contractors are now considering design of rigs capable of drilling wells from grass roots to pay with gas.

New method of completion may save as much as $10,000 per well in the cost of day-work. Formerly 14 days were required for completion with cable tools, now slightly more than a single day is required to drill in a well using gas for circulating medium.

How it is done. — Wells are drilled conventionally with rotary tools and water-base mud to a depth of 1,500 ft., the top of Cliff House sand, a gas reservoir. A long string of 7-in. casing is cemented on top of this formation.

From this point natural-gas circulation is used in the "drilling-in" process. A 6½-in. to 6¾-in. hole is cut below the casing shoe through a 900-ft. formational sequence including 250 ft. of the Cliff House gas sand, 300 ft. of Menefee shale, and the 250-ft. Point Lookout gas sand.

Natural gas is piped from a nearby high-pressure gas well and fed into drill pipe through the kelly under 400-psig. pressure. From 1,500 to 2,000 M.c.f. of gas is required for a single day's operation; this is all the volume needed for the entire drilling-in operation.

Natural-gas circulation speeds completion of these gas wells. Only 26 hours is required to cut the 800-ft. gross section containing the pay sands, and the job is done with two bits.

High-pressure gas, going down the drill pipe, passes through the water courses in the rotary drilling bit. At the point of high pressure differential —the drilling bit—the gas cools on expansion to lower pressure, and this cooling action prevents the dry rotary bit from burning up.

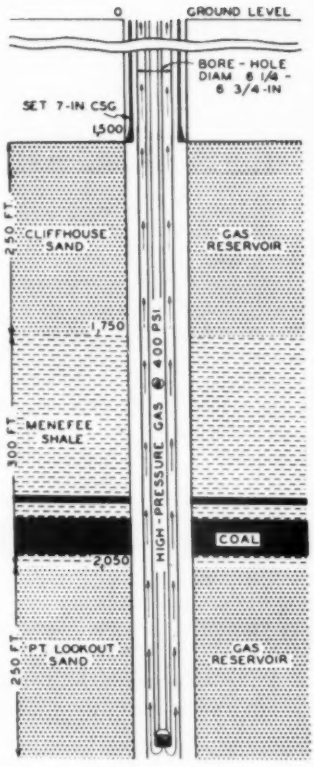
At the bottom of the hole, the blast of cool gas carries drill cuttings up the hole. Cuttings-laden gas emerges from the annulus and flows to a 2-in. lead line at a safe distance from the rig, where the spent gas is flared.

Color of emergent gas changes with the formation drilled. If limestone, the appearance is chalky-white; however, as the bit enters a Menefee coal streak, the color of the blast turns to sooty-black.

Bearings stand up well in spite of lack of fluid circulation and remain tight. However, the bit heads appear sand-blasted after cutting the section.

Lost circulation.—Use of gas as a circulating medium in rotary drilling has proven highly effective in combating the troublesome Menefee shale section.

Coal streaks up to 40 ft. in individual bed thicknesses are found throughout the Menefee above the Pictured Cliffs gas-sand reservoir; the cavernosity of these coal beds "drank mud," in driller's parlance, resulting frequently in lost circulation when drilling with conventional drilling methods and mud.



DRILLING WITH GAS.—Generalized pay-section diagram showing application of new rotary drilling method employing gas as circulating medium: high-pressure gas introduced through kelly passes downward into drill pipe, through bit upward through annulus to well head, and led away for flaring.

Development. — Credit for the innovation has been given to C. L. Perkins, vice president in charge of production for El Paso Natural Gas Co., El Paso, Tex. Others who assisted in development of the method are L. Fuller, drilling superintendent, and Truitt Hollis, chief engineer. Contractors, which include Big Chief Drilling Co., have employed this method in drilling wells for Delhi Oil Corp., Southern Union Natural Gas Co., as well as El Paso.

Search for a drilling method which would offer a faster and improved way for drilling-in wells in Cretaceous gas reservoirs in San Juan Basin led Perkins to develop this method. He recalled how a seismograph crew in Wyoming used a compressed-air blast in a shot-hole to speed drill-

ing rate; the method worked and the shot-hole was cut in rapid order.

Air, mixed with oxygen, is a dangerous explosive, so Perkins tried gas under pressure introduced in much the same manner as drilling fluid. First well to be drilled in this manner was El Paso's 3 Grambling in Blanco-Largo area of San Juan County, a gas well drilled with gas.

Limitations.—However, the "gas" method probably has its limitations. Drilling with natural gas may not be practicable except within about 5 miles of a producing gas well. High-pressure connections must be provided, but drillers are overcoming this by raising substructure on future wells and installing central and stripper equipment for handling the circulating volume of 2,000,000 cu. ft. per day and the natural flow of the penetrated gas reservoirs. Open-flow volumes average from 500 to 1,000 M.c.f. per day. A 10-in. master valve and a double stripper head are installed on each well prior to drilling-in operations.

(A related article on the use of compressed air in drilling-in operations appeared in The Oil and Gas Journal, June 21, page 152).

WEST COAST

Oil Aplenty

California agency opposes plans for crude-oil, products lines from Texas, says West Coast self-sufficient in oil

LOS ANGELES. — California can produce more than enough petroleum to meet civilian demands on the entire West Coast and no pipe line is needed to bring crude or products from other regions, it is contended by the Oil Producers Agency of California.

The conclusion was based on a forecast of California's producing ability and the probable growth in demands in the five western states commonly grouped as District 5.

The steel which might go into a pipe line would provide more oil for the West Coast if used for drilling and production in California, it was declared by D. T. Staples, president of the agency. Staples sent the report to the Petroleum Administration for Defense, which now has before it an application for allotment of steel to construct twin crude and products pipe lines from West Texas to California *(The Oil and Gas Journal, June 14, page 59, and July 5, page 115).*

Demand estimate.—The forecast covers the 5-year period 1951-55, and concludes that California can supply anticipated civilian demand plus a surplus of 130,000 bbl. per day for emergency needs.

The estimate shows that total civilian demand on the Pacific Coast has increased 3.6 per cent per year and that California's crude-oil reserves have increased an average of 82,111,000 bbl. per year in the 5-year period 1946-50. Yearly crude production has averaged 9.4 per cent of reserves during the same period.

Projection of these trends indicates that by 1955 civilian demand will be 991,000 bbl. per day, reserves will be 4,066,096,000 bbl., and crude-producing capacity will be 1,047,000 bbl. per day.

This estimate does not include production of natural-gas liquids, forecast at 74,000 bbl. per day in 1955, and which would bring total production of liquid hydrocarbons to 1,121,000 bbl. daily and provide a surplus of 130,000 bbl. per day.

Supply picture. — Normal receipts from outside the West Coast, which consist of lubricants, some fuel oils, and other refined products, have averaged 17,000 bbl. per day and at that rate would increase the over-all surplus to 147,000 bbl. per day by 1955, the survey predicts. In event of emergency, the agency said, Elk Hills Naval Reserve could produce 120,000 bbl. of crude per day, bringing the total surplus to 267,000 bbl. per day.

Staples said that if necessary, crude production could be increased to a rate greater than 9.4 per cent of reserves, and under conditions of war-time rationing of civilian use there would be from 400,000 to 500,000 bbl. per day available for military needs on the West Coast.

In submitting the report to PAD, Staples said: "The estimate shows that greater results, in terms of steel needed, can be expected if the steel is made available for California oil wells rather than for pipe lines. The average return of oil per ton of steel per oil well drilled in California has been 1⅔ bbl. per day. Estimates for one proposed pipe line indicate that only 1½ bbl. of oil per day per ton of steel can be delivered in California."

Raisin City Sale

LOS ANGELES. — Sunset Oil Co. and Eagle Oil & Refining Co., Inc., have acquired controlling interest in Mission Oil Co., Padre Oil Co., and Real Oil Co.

The three companies hold leases on about 570 acres in Raisin City field in Fresno County and have a current production of about 1,300 bbl. per day from 12 wells.

J. D. Sterling, president of Sunset and Eagle, said it is planned to begin drilling immediately on offsets to flowing wells recently completed on adjacent property.

Richfield to Appeal

LOS ANGELES. — Richfield Oil Corp. said last week it will appeal to the U. S. Supreme Court a federal District Court ruling that its exclusive-dealer contracts with retail outlets violate the antitrust laws.

A Richfield spokesman said the court's ruling that leasing a station to an operator sets him up as an independent businessman and that provision for terminating the lease on 24-hour notice was illegal "places legalism above realism, form above substance."

"We can always operate our own stations with salaried employes or with agents, but we believe it can make no difference as far as the antitrust laws are concerned how we choose to run such service stations," he said.

EASTERN

Quaker State Buys Holdings

OIL CITY, Pa.—Quaker State Oil Refining Corp. has signed a contract, subject to approval of title, for the purchase of approximately 25,000 acres of oil and gas holdings on which there are about 3,000 wells, from Northern Ordnance, Inc., John B. Hawley, Jr., and affiliated interests.

Consideration involved in sale of the properties, located in Venango, Warren, and Forest counties, was not disclosed, but it is estimated that it was in excess of $1,500,000.

The properties will continue to be operated by the former owners pending title examination, and possession will be taken by Quaker State when titles are passed, probably in about 30 days.

The sale is one of the largest in this oil-producing area in recent years. The approximately 3,000 wells included on the properties comprise both oil, gas, and repressure wells.

In addition, the deal includes seven compressor plants, 45 houses located on the properties, and oil-producing equipment of the present owners.

The deal for purchase of extensive oil and gas properties in the three counties was announced by Quaker State almost a year to the day after the local firm had bought slightly larger Pennsylvania holdings from Cities Service Oil Co., New York City.

Integrated Operation

Six-plant "settlement" starts with crude oil, winds up with rubber, plastics, petrochemicals, and much more

F. Lawrence Resen

LAKE CHARLES. — A proposed petrochemical plant will bring to seven the number of plants in a massive industrial settlement here devoted to getting the most out of a barrel of oil.

The six, and the planned seventh, have a mutual dependence on crude oil as their primary raw material, and also have a direct and indirect interdependence on each other in the making of products from crude oil.

When expansion and construction have been completed, the combined processing facilities will have an investment value in excess of $200,000,000.

This trend of interwoven processing facilities is becoming more commonplace along the Gulf Coast where larger refineries have diverted large portions of their products into chemical installations. This is notable at Shell Oil Co.'s Deer Park facilities, where Shell Chemical Co. and Lubrizol Corp. utilize refinery outputs for chemical manufacture, and at Gulf Oil Corp.'s Port Arthur refinery, where a new ethylene plant and isooctyl alcohol plant will process refinery products.

End products.—Oil processed in basic refinery installations and further processed in the supplementary plants is transformed into aviation gasoline, jet fuels, butadiene, synthetic rubber, lubricating oils, waxes, plastics, and many petrochemicals.

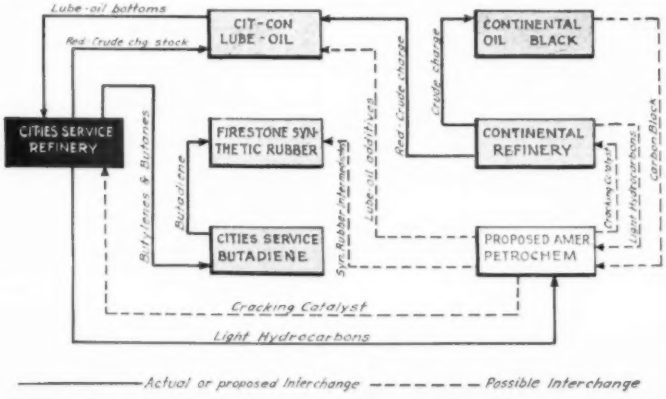
With the completion of current program, the total capacities will read like this:

Crude-oil charge, 190,000 bbl. per day.
Lube-oil stocks, 6,000 bbl. per day.
Refined wax, 194,000 lb. per day.
Butadiene, 55,000 tons per year.
GR-S copolymer, 65,000 tons per year.
Carbon black, 25,000,000 lb. per year.
Petrochemicals, (unannounced).

It all started back in 1941 when Continental Oil Co. built its 11,000 bbl. Westlake refinery. The big stride came when Cities Service Refining Corp. placed a mammoth 80,000 bbl. refinery on stream in 1944 which has now been increased to 150,000 bbl. Further construction included a rubber plant, a butadiene plant, a lube-oil plant, a carbon-black plant, and the most recently announced program, construction of a petrochemical plant.

Cities Service.—The greatest single undertaking at Lake Charles was the construction of the refinery by Cities Service at a cost in excess of $75,000,000.

The entire plant was constructed on virgin land, where no provisions whatsoever had to be made to tie in with existing structures or units. The plant was described as the realization of every refiner's dream *(The Oil and Gas Journal, July 8, 1944, page 84)* when it was built from a master plan. At about the same time the Government built the butadiene plant operated by Cities Service and the copolymer plant operated by Firestone Tire & Rubber Co.



***INTEGRATION IN OPERATION.**—This diagram shows the interdependence of the "settlement" plants near Lake Charles, all of which look to the same original raw material—crude oil.*

Feed stock for the 55,000 ton per year butadiene plant is obtained from the three catalytic cracking units and a thermal reforming unit at the refinery. The stock consists of normal butylenes, isobutylene, normal butane, and isobutane.

Butadiene is an important component in the manufacture of GR-S type synthetic rubber which is made by copolymerizing styrene with butadiene. Part of the output of the Cities Service-operated butadiene plant is utilized by the Firestone-operated synthetic rubber plant, which was built on an adjacent site. Sixty thousand tons of GR-S copolymer are produced each year at the copolymer plant.

Cit-Con. — Another plant integrated with the basic refinery is Cit-Con Oil Corp.'s $42,000,000 refinery for the manufacture of lubricating-oil base stocks and wax products. Owned on a 65-35 basis by Cities Service and Continental, the plan produces 6,000 bbl. of lube-oil stocks and 194,000 lb. of refined wax per day.

About 25,000 bbl. of reduced-crude charging stock are pumped from the topping stills at Cities Service to the lube-oil plant. The feed stock is processed for its lube-oil and wax components, and the gas-oil, solvent-plant extracts, and various wax by-products are returned to the basic refinery for further processing.

American Petrochemical.—The newest proposed addition to the industrial petroleum community will be American Petrochemical Corp.'s installation for the manufacture of essential chemicals from petroleum hydrocarbons. American will be a joint venture on a 50-50 basis between Cities Service and Firestone.

Continental Oil Co. — The nearby Westlake refinery of Continental is currently in the process of having its capacity more than tripled. The $24,000,000 expansion program will raise its crude-oil charge to 40,000 bbl.

It is possible that some of the light hydrocarbons which will be produced here might also be used by the petrochemical plant. Selected crude oils will be segregated and processed at the refinery to produce a high-quality residuum which will be pumped to Cit-Con.

Part of the crude processed at Westlake will be used to produce 25,000,000 lb. per year of high-abrasion carbon at the Continental Oil Black carbon-black plant just completed there. The plant is a jointly owned project of Continental Oil and Continental Carbon Co.

The processing segment of the oil industry is almost completely covered by the many installations at Lake Charles.

Lube-Oil Outlook

Production now at record level; some expansion now being considered, but future too uncertain for definite plans

George Weber

NEW YORK.—Domestic lubricating-oil production is currently estimated to have reached a new record level.

A strong market dating from about 1 year ago has continued to demand high output rates from expanded and modernized United States refineries. In view of the uncertainties involved in lubricant demand over the next several months, however, the present upward trend cannot be safely projected at this time.

Capacity for lubricating-oil production, as revealed in a survey conducted earlier this year by the National Petroleum Association, shows a total of 174,757 bbl. per day in operating refineries.

This total differs but slightly from the aggregate capacity reported for the previous year. The survey, compiled from data submitted to the association by refiners, lists a total of 65 operating lube-oil plants. Five plants were reported as not operating.

Of the operating total, 38 employ one or more of the solvent refining processes and account for nearly 90 per cent of productive capacity in this country. Of the five shutdown plants, four are listed as "conventional," which connotes the use of acid and clay treating without solvent refining or dewaxing facilities.

Expansion plans.—Individual plant capacities remained essentially unchanged over the past year. The record-breaking postwar construction program, which greatly modernized and expanded domestic facilities, halted temporarily with the completion of the last major project in late 1950. At present, no new contracts for major lube-processing units have been announced, although several refiners are known to be considering further construction.

Refinery construction plans for the future are generally conceded to include added facilities for lube-oil manufacture. For the present, however, the operating capacity in this country is considered to be sufficient despite the fact that refiners are producing at about 98 per cent of rated capacity. This high percentage figure illustrates the fact that lube-processing facilities, like basic refining capacity, can be operated at rates exceeding estimated capacity.

Thus, while the nation's capacity is estimated to total about 175,000 bbl. per day, theoretical top capacity employing all facilities to the limit might approach 200,000 bbl. per day. This flexibility is possible particularly in the larger integrated plants which over the past several years have accounted for more and more of the nation's capacity.

Foreign capacity.—The postwar program of lube-plant construction abroad has lagged that in this country, but substantial capacity is being added in Europe and Latin America at the present time. In Europe, about 12,200 bbl. per day is now under construction or proposed for early erection. Latin American and Caribbean refiners are adding about 6,500 bbl. per day to capacity.

The effect of this foreign construction will be a gradual lessening of export demand for United States refiners. But the predictions of the not-too-recent past, that export demand would dwindle to a negligible figure, are being modified at this time. The long-anticipated slump in exports from this country has not yet developed. Exports for April, the last month for which official figures are available, totaled 1,441,000 bbl., only slightly less than the high of 1,594,000 bbl. sent abroad during March.

Rapid industrial recovery in Europe is credited for much of this sustained demand. There is also a strong indication that many foreign buyers are adding to stocks in these uncertain times. Assuming a continuation of present recovery trends abroad, some observers concede that while exports will taper off as new capacity is added abroad, foreign demand on this country's production will not fall to negligible figure predicted a year or more ago.

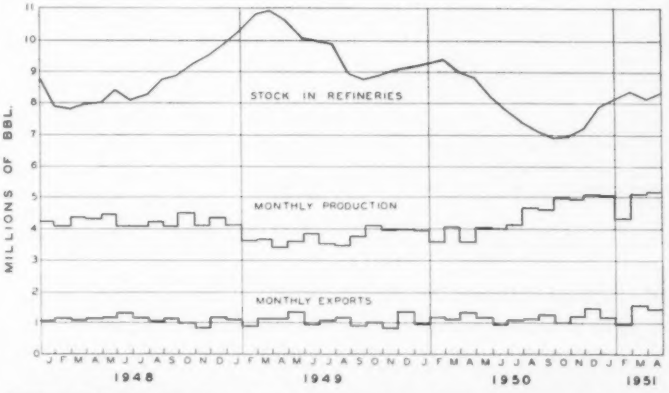
No prophets.—Prophets in the lube-oil industry are hard to find these days. This is understandable since the lubricants market has experienced two abrupt reversals in the recent past. In meeting the situation of postwar shortages which continued for several years, lube refiners built new plants at such a rate that it appeared in late 1949 that the industry had overbuilt. Until early summer of 1950 the lube market continued to soften.

Then, abruptly, the effect of the Korean war, superimposed on a temporary period of partial production due to strikes, reversed the market and by autumn lubricants were again in short supply. Stocks at refineries dipped to a long-time low of 6,950,000 bbl. at the end of September. It is impossible to estimate how much of this drain on refinery stocks was due to overbuying during the early months of the Korean war, and how much resulted from increased military, industrial and other consumption.

The strong lube-oil market has continued to be present. Refinery stocks have returned to over 8,000,000 bbl. Not all classes of lube stocks are firm today. High-viscosity stocks are in good demand and Pennsylvania cylinder stocks are still in short supply. Neutrals are soft in spots and observers say they could become softer. The possibility of a Korean peace may have some long-term effect in lessening military and industrial demand, but a more immediate effect might be felt in the changed attitude of other buyers.

Future uncertain.—This present uncertainty is largely responsible for the reluctance of refiners to enter into new lube-plant construction, even though the projected expansion of other refining facilities indicates a coming imbalance in some cases.

No mention of lube-oil facilities has been made with regard to the Government's program of permitting accelerated amortization, and the list of certificates granted by PAD has to date included none for lube-processing units. Some lube projects are understood to have been included in


MILLIONS OF BBL.
STOCK IN REFINERIES
MONTHLY PRODUCTION
MONTHLY EXPORTS
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A
1948
1949
1950
1951

RECENT HISTORY.—This chart shows lube-oil stocks, production, and exports during the past 3 years.

applications for rapid amortization, but all applications thus far recommended for approval have concerned basic crude capacity, catalytic cracking and reforming, alkylation, and aromatics production.

Events of the next few months, it is believed, will determine when construction of new lubricating oil capacity will be resumed in this country. Meanwhile, refiners are taking a "wait and see" attitude.

UNITED STATES REFINERIES PRODUCING LUBRICATING OILS

Company and refinery location	Crude capacity (bbl. daily)	Solvent extraction	Solvent dewaxing	Propane deasphalting	Finished lube capacity	Lube processes
Atlantic Refining Co., Philadelphia, Pa.	117,000	5,600	2,500	2,500	5,000	Nitrobenzene, phenol, MEK-benzol, propane, acid-clay
Bayou State Oil Corp., Houston, La.	800				40	Hight. vac. dist., acid-clay
Berry Asphalt Co., Waterloo, Ark.	1,500				250	Spec. vac. dist.
Calumet Refining Co., Burnham, Ill.	1,200				750	Hight. vac. dist.
Calumet Refining Co., Princeton, La.	700				425	Crude dist., acid-clay
Champlin Refining Co., Enid, Okla.	26,000	*2,858			1,800	Duo-Sol, phenol
Citgo Corp., Lake Charles, La.		17,500	6,500		6,000	Duo-Sol, furfural, MEK-benzol
Cities Service, Ponca City, Okla.	29,000				†1,050	Acid-clay
Continental Oil Co., Ponca City, Okla.	52,500	2,750	2,450		1,800	Duo-Sol, furfural, MEK-hexane, benzol, Barsol
Cooperative Ref. Assn., Coffeyville, Kans.	20,000	1,800	2,000		1,500	Furfural, MEK-benzol
Berry E. Cross Co., Shackover, Ark.	6,000				1,000	Vac. dist., acid-clay
Crown Central Petroleum Corp., Houston	4,000				1,000	Conventional
Deep Rock Oil Corp., Cushing, Okla.	16,000				850	Conventional
Elk Refining Co., Falling Rock, W. Va.	4,000				1,000	Conventional
Esso Standard Oil Co., Baltimore	52,000				100	Conventional
Esso Standard Oil Co., Bayonne, N. J.	30,000	2,000	6,000		6,500	Phenol, MEK-benzol, acid-clay
Esso Standard Oil Co., Baton Rouge, La.	240,000	11,000	6,000	2,500	7,500	Phenol, MEK-benzol, propane dewax, and deasphalt, acid-clay
Freedom-Valvoline Oil Co., Freedom, Pa.	4,000				800	Conventional
Golden Bear Oil Co., Bakersfield, Calif.	2,500	500			1,100	Furfural
Gulf Oil Corp., Philadelphia, Pa.	107,000	2,000	11,200		1,100	Duo-Sol
Gulf Oil Corp., Port Arthur, Tex.	250,000	11,000	2,400	4,000	12,000	Furfural, phenol, MEK-benzol, propane, Alchlor, Sharples dewax
			12,700	12,800		
Humble Oil & Refining Co., Baytown, Tex.	280,000	6,500	10,000	7,800	12,200	Propane, phenol, MEK-benzol, acid-clay
Kendall Refining Co., Bradford, Pa.	4,800	900	1,200	1,200	1,200	Phenol, propane, pressing
Lion Oil Co., El Dorado, Ark.	22,000				1,000	Spec. vac. dist.
McBride Refining Co., La Blanca, Tex.	1,500				100	Conventional
MacMillan Petroleum Corp., Norphlet, Ark.	4,500				1,250	Spec. vac. dist.
Magnolia Petroleum Co., Beaumont, Tex.	156,000	4,200	6,500		5,400	MEK-benzol, Duo-Sol, furfural
Mid-Continent Petroleum Corp., Tulsa	50,000	2,500	3,000	2,500	1,000 to 6,000	Chlorex, propane
National Refining Co., Findlay, Ohio	12,000				600	Acid-clay
Paramar Refining Co., Bakersfield, Calif.	1,300				Not stated	Vac. dist.
Penna. Refining Co., Karns City, Pa.	1,300				300	Conventional
Pennzoil Co., Oil City, Pa.	6,500	1,000	2,250		2,250	Chlorex, MEK-benzol
Phillips Petroleum Co., Ponca City, Okla.	6,000				‡‡	Acid-clay
Phillips Petroleum Co., Kansas City, Kans.	50,000	2,000	2,000	2,000	1,500	Phenol, propane
Pioneer Oil & Ref. Co., Somerset, Tex.	1,400				1,400	Contact filter
Premier Oil Refining Co., Fort Worth, Tex.	6,000				1,700	Conventional
Pure Oil Co., Cabin Creek, W. Va.	1,500				450	Conventional
Pure Oil Co., Nederland, Tex.	58,200				2,100	Phenol, MEK, propane
Quaker State Oil Ref., Emlenton, Pa.	2,000	1,680	2,000		1,700	Furfural, MEK-benzol
Quaker State Oil Ref., Farmers Valley, Pa.	4,000	1,680	2,700		2,250	Furfural, MEK-benzol
Quaker State Oil Ref., Oil City, Pa.	2,800				600	Conventional
Quaker State Oil Ref., St. Marys, W. Va.	2,500	680			600	Furfural
Rainfield Oil Corp., Watson, Calif.	100,000				275	Conventional, vac. dist.
Shell Oil Co., Houston, Tex.	115,000	3,400	3,700	2,800	2,800	Phenol, propane, MEK-benzol, clay filter
Shell Oil Co., Martinez, Calif.	40,000	4,880			3,300	Sulfur dioxide, furfural, acid-clay
Shell Oil Co., Wood River, Ill.	120,000	3,000	3,600	2,300	2,300	Duo-Sol, propane, acid-clay
Sinclair Refining Co., East Chicago, Ill.	85,000	5,100	4,750	4,250	2,300	Propane, phenol, MEK-benzol
Sinclair Refining Co., Houston, Tex.	85,000	3,500	4,000	4,000	2,300	Propane, phenol, MEK-benzol, acid
Sinclair Refining Co., Wellsville, N. Y.	5,000		1,500	1,500	2,250	Nitrobenzene, MEK-benzol, contact treating
L. Sonneborn Sons, Inc., Franklin, Pa.	1,650				500	Conventional
L. Sonneborn Sons, Inc., Petrolia, Pa.	*4,000				1,000	Conventional
Sorony Vacuum Oil Co., Olean, N. Y.	7,000	1,300	1,200		1,200	Chlorex, MEK-benzol
Sorony Vacuum Oil Co., Buffalo, N. Y.	22,000				1,000	
Sorony Vacuum Oil Co., Paulsboro, N. J.	56,000	7,580	6,300	5,950	7,000	MEK-benzol, Duo-Sol, furfural
Standard Oil Co. of Calif., Richmond, Calif.	138,000	16,500	9,800		9,000	MEK-benzol, R.P.M. solvent, phenol
Standard Oil Co. (Ind.), Casper, Wyo.	15,500	600			620	Chlorex
Standard Oil Co. (Ind.), Whiting, Ind.	192,000	2,500	2,200	1,200	3,000	Phenol, propane
Standard Oil Co. (Ind.), Wood River, Ill.	42,000	2,300	1,400		1,040	Chlorex, propane
Standard Oil Co. (Ohio), Cleveland, Ohio	42,500				1,500	Conventional
Standard Oil Co. (Ohio), Lima, Ohio	36,500				1,800	MEK-furfural, P.D.A.
Standard Oil Co. (Ohio), Toledo, Ohio	20,000				900	Conventional
Sun Oil Co., Marcus Hook, Pa.	140,000	8,000	4,500		11,800	MEK-benzol, mercury vac. dist., Duo-Sol, furfural
Texas Co., Lawrenceville, Ill.	47,000	2,000	†1,400		†1,150	Furfural, acetone-benzol
Texas Co., Port Arthur, Tex.	290,000	18,000	11,000	4,000	16,000	Furfural, sulfur dioxide, MEK-benzol, propane
Three Rivers Refinery, Three Rivers, Tex.	1,500				750	Vac. dist., acid-clay
Tide Water Associated Oil, Avon, Calif.	85,000	1,660			1,660	Sulfur dioxide
Tide Water Associated Oil, Bayonne, N. J.	74,000	7,000	3,500	3,400	2,400	Sulfur dioxide, furfural, MEK-benzol, propane
Union Oil Co. of Calif., Oleum, Calif.	72,800	7,200	1,500		1,800	Duo-Sol, phenol, propane, acid-clay
United Refining Co., Warren, Pa.	5,500				1,400	Semiconventional
Utah Oil Refining Co., Salt Lake City, Utah	26,000			§10,000	85	Conventional
Wolf's Head Oil Refining Co., Reno, Pa.	2,500				650	Conventional

*Phenol for light neutrals—Duo-Sol for heavy lubricating oil. †Not operating at present. ‡Sharples dewaxing. §Alchlor refining. ‖1949 figures. ¶1950 figures. ‡‡Not for lube production.

Fire Wrecks Terminal

Agencies combine investigation into mysterious flames which caused heavy damage at Warren's Newark terminal

NEW YORK.—A combined investigating committee this week is attempting to discover the cause of a fire and series of explosions which virtually wrecked the L.P.G. terminal of Warren Petroleum Corp. at Newark, N. J., July 7 and 8.

Approximately 1,500,000 gal. of propane burned and exploded all 70 high-pressure storage tanks in one section of the tank farm. Another 30 tanks in a different section did not explode.

Damage to the terminal and nearby property was estimated by observers at $5,000,000, but Warren officials believe that a check now in progress will total a much lower figure. No one was killed but 11 persons were injured, only one, a terminal employe, sufficiently to require hospitalization.

Mystery.—Cause of the fire was a complete mystery as the inquiry opened. Sabotage was hinted when a number of old artillery shells were found on a dump near the property, but further investigation indicated that these had no connection with the disaster.

Company officials were at a loss to offer an explanation for the explosion. The tanks were each 70 ft. long and 103 in. in diameter, with a capacity of 30,000 gal. each, and a shell thickness of 1 in. designed for a pressure of 250 psi., and meeting all standards of A.P.I. and A.S.M.E. codes. All known safety and pressure-relief devices were installed.

Spectacular.—The first tank blew up without warning about 11 a.m. Saturday. Few employes were on duty, and most of them were at the dock, about ¾ mile from the tank farm, where the S.S. Natalie O. Warren had just discharged a cargo of propane into the pipe line. On seeing the first explosion the master cast off the ship and pulled away from the dock, so the vessel escaped without damage.

The fire burned many hours and was one of the most spectacular in Newark's history. Flames and a mushroom of smoke were seen for many miles, and explosions were heard as far away as New York's International Airport, 20 miles to the east. One after another the huge tanks exploded, propelling themselves great distances and scattering fragments over an area of several blocks. The terminal is in an industrial section of Port Newark which is not heavily populated.

Joint inquiry.—Federal, state, city, and insurance agencies began investigations immediately, but this week they joined for a single combined inquiry. The Warren company employed H. Emerson Thomas, an independent consulting engineer and chairman of the safety committee of the Liquefied Petroleum Gas Association, to make a separate investigation and report.

The fullest cooperation was being displayed by the several investigating agencies, the company officials said, and there were no recriminations against the company nor charges of laxity in safety precautions.

No shortage.—The most gratifying aspect of the disaster, Warren officials said, was the way in which the entire L.P.G. industry rallied to the assistance of the company. Offers of technical aid came from as far away as California. A large number of competitive distributors of L.P.G. immediately offered to supply Warren's eastern customers during the emergency, and tank-car shipments were diverted from other destinations and headed toward Newark while the fire was still in progress.

The loss of the supply and terminal facilities will not pinch consumers in the Newark area, Warren officials said, because the company has ample supplies of propane at producing plants in the Southwest and at this time of year has sufficient railroad tank cars to bring in new supplies immediately.

Industry Briefs

SAN FRANCISCO. — Construction of a $6,500,000 natural-gasoline and pressure-maintenance plant for the Elk Hills Reserve of San Joaquin Valley has been ordered by the Navy. The plant will be designed to handle 50,000 M.c.f. with provisions for easily doubling its capacity. When completed the plant largely will be used in injecting gas into the lower Stevens zone.

WASHINGTON.—Rep. Oren Harris of Arkansas has introduced a resolution in Congress directing the Secretary of the Interior to confer with domestic oil-industry representatives to develop means by which skilled technicians may be made available to Iran if Iran requests such assistance.

TUCSON, Ariz. — Two major oil companies have taken important lease concentrations in Coconino and Mohave counties. In Coconino County, Sinclair Oil & Gas Co. has taken 100,000 acres in a 500-sq.-mile rectangle north of Ash Fork. Sun Oil Co. has leased a concentration of federal lands in Mohave County.

LOS ANGELES.—Union Oil Co. of California has begun allocating premium gasoline to dealers because of a limited supply of tetraethyl lead. Union said premium fuel is being issued on a basis of 1950 sales. To meet present demand, the company said, it would need 15 to 20 per cent more tetraethyl lead than it is presently being allocated by the Government.

PHILLIPS, Tex.—Employes of Phillips Oil Co.'s refinery here have completed 1,000,000 man-hours without a lost-time accident since January 13. From 1930 to 1948, the refinery averaged 38 lost-time accidents per year. Since an intensive safety program was launched in 1949, the average has dropped to six per year, according to G. E. McKenna, refinery superintendent.

DUCHESNE, Utah.—Carter Oil Co. gave the Uinta basin its third commercial oil discovery when its 1 Ute Tribal, C SE NE 17-4s-4w, Duchesne County, was brought into production near here this week. The discovery flowed 363 bbl. of oil in 36 hours, 12 minutes into tanks. The flow was accompanied by a small amount of basic sediment containing from 15 to 25 per cent of water believed to be filtrate. Producing reservoir is the fractured shale zone of basal Green River (Tertiary) age, penetrated to 7,596 ft., present total depth.

NEW YORK.—Sinclair Refining Co. has awarded contract for construction of two ocean-going tankers to Bethlehem Steel Corp., Shipbuilding Division. Specifications call for a length of 600 ft., dead weight of 25,000 tons, and a cargo-carrying capacity of 210,000 bbl. of gasoline or 175,000 bbl. of crude oil.

BEAUMONT.—Sun Oil Co. has taken a 10-year lease on all but the ground floors of the 15-story San Jacinto Building and its annex. Sun has maintained Beaumont headquarters here for the last 23 years and currently occupies half the office space in the two buildings.

WASHINGTON. — The Senate has granted a further extension, until January 31, 1951, for the "all fuels" investigation undertaken last year by the interior-affairs committee. So far only one hearing has been held, but the committee plans to get down to intensive work this fall.

SAN FRANCISCO.—Shell Oil Co. completed a new water terminal at Colusa on the upper Sacramento River last week. The terminal will handle nearly 2,500,000 gal. of petroleum products monthly, serving the upper Sacramento Valley and southern Oregon.

Clamp-Down on Gas

Shortage of line pipe leads PAD to issue orders banning acceptance of new customers by natural-gas companies

WASHINGTON.—A tentative order banning the acceptance of new customers by natural-gas companies was laid before representatives of the gas industry this week by PAD officials.

Necessitated by the shortage of line pipe, the order as worked out this week will be laid before the Gas Industry Advisory Council when it meets in Washington July 23.

Following consideration by the council, the order, which would freeze the gas companies to their present space-heating and large-volume customers, with some exceptions, probably will be made effective next month. It will not be retroactive, and present customers will be protected.

Exemptions.—Provision will be made in the order for exemption or modification of its provisions wherever natural-gas supplies are adequate.

Special consideration will be given in hardship cases and for communities where natural gas has only recently been installed or where previous service was by manufactured gas. Large-volume consumers will also be taken on by companies, with the consent of PAD, for completely interruptible service.

The order will apply only to companies supplying natural gas or mixtures of natural and manufactured gas and will not affect any manufactured-gas service.

Protest raised.—Announcement that a freeze on natural-gas service was under consideration was made last week and immediately brought a large volume of protests, mainly from equipment manufacturers and some members of Congress who saw their hopes of new pipe lines to their constituents blasted.

There has been considerable pressure from the military for some time, however, for a prohibition on new pipe lines until defense areas are adequately supplied.

Operation of a number of vital defense plants and reactivation of others has been retarded by inability to secure firm commitments of adequate supplies of gas, and it is expected the situation will be seriously worse next winter.

The matter was officially called to the attention of Deputy Petroleum Administrator Bruce K. Brown last month by John D. Small, chairman of the Munitions Board, who said flatly that it is the opinion of the Defense Department that it is essential that no further expansion of the natural gas market be permitted for the present in areas east of the Mississippi River.

When the supply of natural gas has been increased through expansion of existing pipe lines or construction of new ones to a point which will assure a 100 per cent supply throughout the entire year for all essential industrial users, Small said, the department will assent to consideration of lines to new areas. But for the present, he declared, construction of additional lines should be limited to projects with relatively short mileage that augment supplies in critical consumption areas.

Hits conversions.—Small recommended that PAD "at once issue appropriate orders to prohibit, east of the Mississippi River, conversion to the use of natural gas any domestic or industrial facilities now using other types of fuel and to prohibit supplying natural gas to new housing facilities or to new industrial facilities unless such industrial facilities are essential to defense production and can operate only on gas."

Even before the Munitions Board protest, however, PAD officials had reached a decision not to approve the construction of any long-distance pipe lines to serve new areas.

Steel allotment.—In its application to the Defense Production Administration for the fourth-quarter allotment of steel for the oil and gas industry, PAD pointed out that its figure for line pipe had been cut 250,000 tons under minimum requirements because it was certain the mills would fall that far short of producing what is needed.

This point was also pressed by C. Pratt Rather, assistant deputy administrator in charge of gas transmission and distribution, who, as did Brown, emphasized that PAD is acting reluctantly to curtail gas service and only because of the necessity of protecting present customers and insuring the supplies needed for defense activities.

"It is obvious that natural gas is in tight supply at the point of use because of inadequate transportation," Rather said.

Pipe insufficient.—"The amount of line pipe allotted to the gas industry for the third quarter of this year was insufficient to complete necessary projects," he explained. "The steel available for gas-transmission and distribution lines, for instance, was only 59 per cent of the absolute minimum needs as determined by PAD. This was not enough to permit completion of even the highest-priority projects already under construction and essential to meet this winter's requirements."

At the same time, Rather said, demand for gas is increasing at a tremendous pace, and companies throughout the country have reported anticipations of increases from 12 to 22 per cent above last winter's peaks.

"Obviously something has to be done to protect those customers who are presently dependent upon natural gas from extreme hardship and to keep defense plants working to the extent possible," he added. "This is more important than providing heat or desirable service to those who are already supplied by other means."

Brown pointed out that the proposed order is also unfortunate in that it makes natural gas the first consumer product to feel the full impact of the defense program. But, he said, unless something is done promptly, a serious gas shortage almost certainly will occur next winter.

Amortization O.K.'s Issued

WASHINGTON.—A certificate for accelerated amortization of 70 per cent of a $9,000,000 investment in facilities for the production of aviation gasoline at Richmond, Calif., has been issued to Standard Oil Co. (Calif.) by the Defense Production Administration.

The certificate was the largest of several announced as having been granted the oil industry. Others provide for quick write off of 75 per cent of a $6,094,710 project for natural-gasoline production by Phillips Petroleum Co. in Brazoria County, Texas; 75 per cent of $1,132,700 for natural-gasoline production by Texas Natural Gasoline Corp. in Jones and Fisher counties, Texas; 60 per cent of $2,000,661 of $2,400,211 asked for production of carbon black for the synthetic-rubber program by Sid Richardson Carbon Co. at Fort Worth; 75 per cent of $2,050,000 of $2,650,000 asked for natural-gas production by the Hugoton Production Co., Garden City, Kans.; 85 per cent of $911,000 for gasoline production by Socony-Vacuum Oil Co., Inc., at Paulsboro, N. J.; and 50 per cent of $55,100 for butane by Warren Petroleum Corp., Breckenridge, Tex.

Several certificates were issued for 50 per cent amortization of storage facilities, including approval of $210,702 of $218,883 asked for gasoline storage by W. H. Barber Co., St. Paul; $190,000 for fuel-oil storage by Wyatt, Inc., New Haven, Conn.; $120,000 of

WATCHING WASHINGTON

Bertram F. Linz

Defense Against Sabotage

Two interdepartmental boards are working hard to develop an industrial-security program to protect vital industrial installations against espionage, sabotage, and other subversive activity.

Refineries, pipe lines, and storage facilities are among the installations of major concern to the Government, and over the past 6 months an Industry Evaluation Board set up by Secretary of Commerce Charles Sawyer last January has been compiling a list of key industrial facilities and their supporting economic resources.

These facilities are being rated as to their relative importance by the board, on which the Interior Department is represented, and the findings transmitted to the government agencies primarily concerned, which then have the responsibility of working out specific security measures with the owners of the plants.

A second group, the Facilities Protection Board, on which Interior also is represented, has just been set up by the National Security Council to provide interdepartmental consideration and stimulus to the improvement of existing government programs and the development of future programs for the physical protection of vital industries.

This board will be primarily concerned with establishing standards for protecting facilities designated by the IEB as especially critical and supervising the agencies primarily responsible for the protection of key facilities.

Last-Minute Drive

A last-minute drive to kill legislation legalizing the cutting of prices to meet those of a competitor was launched this week when the Senate small-business committee opened hearings on the McCarran bill.

The legislation, which would write into law the doctrine set forth by the Supreme Court in the Standard Oil Co. (Ind.) case that it is lawful to discriminate in prices when it is done in good faith to meet the equally low price of a competitor, was scheduled for Senate passage last week but was set over until next month in order to give the committee time for its study.

The committee's investigation is based on numerous complaints against the bill from small businessmen and is a slap at McCarran's judiciary committee, which reported it without holding any hearings. Opponents have made much capital of his failure to give them an opportunity to present their views.

The small-business group is merely an investigative body and has no authority to recommend legislation.

Cease-Fire Effects?

Hopeful of a truce in Korea, Congress, which has moved this year at a snail's pace and is far behind in its work, has still further slowed down its consideration of the administration's mobilization program.

For the oil industry a cease-fire order might have two effects: A reduction of uncertain volume in military and sea-transport oil requirements and a chance of getting more materials for expansion.

Given peace in the Far East, President Truman's already badly mutilated legislation may be slashed still further, so far as civilian controls and taxes are concerned. Cognizant of that, the administration is making a desperate fight to retain as much as it can of the present Defense Production Act.

It is not now indicated that a cessation of fighting will be permitted to slow down the building up of our military might, but the President's requests for blanket authority to construct such new defense plants as he finds necessary and for power to license all businesses subject to price and wage controls already have been tossed out by the Senate. A temporary ban has been imposed on any further rollback of prices which, in modified form, may be made part of the new defense-production act which Congress will attempt to pass this month.

Important changes in the controls on materials are not too likely on the surface, in view of the determination to go ahead with the military buildup, but pressures will be exerted in Congress and elsewhere to get an increase in the share of materials made available for nondefense production.

The changed war situation also may be reflected in the new tax bill. Now before the Senate finance committee, the President's plea for $10,000,000,000 in additional taxes, cut by the House to $7,200,000,000, may be further reduced, possibly to as little as $6,000,000,000.

$280,000 asked for petroleum and coal-tar storage by Arrow Petroleum Co., Forest View, Ill.; $287,212 for fuel-oil storage by the Gulf Oil Corp. at Port Arthur, Tex.; $57,000 for fuel oil by Standard Oil Co. of California at El Segundo, Calif.; $240,000 of $250,000 asked for fuel oil by the Port Terminal Corp., Rensselaer, N. Y.; $95,000 for fuel oil by Oil Products, Inc., Long Island, N. Y.; and $1,150,000 for products storage by California Refining Co. at Perth Amboy, N. J.

Metals Allocation Clarified

WASHINGTON. — Third-quarter metal allotments to PAD for distribution in the oil and gas industry, in addition to the 1,593,000 tons of steel previously announced, include 10,100,000 lb. of copper and 500,000 lb. of aluminum.

The oil industry's allotments were disclosed by the Defense Production Administration in a review of its distribution of the 20,825,000 tons of steel, 1,114,000,000 lb. of copper and 598,000,000 lb. of aluminum expected to be available this quarter.

The third-quarter allocation was considerably below what PAD officials considered the needs of the industry and are less than half of the 24,885,000 lb. of copper and 1,229,000 lb. of aluminum which have been requested for the fourth quarter.

DPA explained, however, that the total unrestricted demand for the two metals was about 35 per cent in excess of the supply. It was necessary to cut allotments generally pretty severely because of the heavy military demands which had to be met. In general, nondefense consumption was reduced by limiting purchases to fixed proportions of normal usage, in the case of aluminum to 50 per cent of the quarterly rate of consumption during the first half of 1950 and in the case of copper to 60 per cent.

Borger Is Critical Area

WASHINGTON.—Borger, Tex., site of the country's largest single refinery for high-octane aviation fuel, has been declared a critical area for defense housing by the Defense Production Administration.

Effect of the designation will be to provide a basis for the relaxation of credit controls on housing by the board of governors of the Federal Reserve System and the Housing and Home Finance Agency. The latter shortly is expected to develop a program for construction of additional housing.

A comprehensive study of the situation in Borger, 80 per cent of whose working population is engaged in production for defense, showed that the present critical situation will be aggravated by 400 additional workers who will be brought into the city soon. Refining at Borger, in addition

to aviation fuel, also is important in the fields of jet-aviation fuel, butadiene, and other military products. Carbon black also is produced here.

Depletion Supported

WASHINGTON. — Representatives of the oil and mining industries appeared before the Senate finance committee this week to head off any chance of a reduction in the percentage depletion allowances.

The committee is holding hearings on the tax bill passed by the House, in which the allowance for oil was left unchanged, and has evinced no disposition to make any changes. Industry representatives testified, however, to offset any impression Secretary of the Treasury John Snyder may have made when he urged the committee to adopt his program for raising $10,000,000,000 which the House ways and means committee had turned down.

Spokesmen for the extractive industries which now enjoy depletion allowances told the committee they are virtually necessary to spur the search for new reserves of oil and other commodities needed for the defense program.

NPA Issues Orders

WASHINGTON.—The following orders have been issued by the National Production Authority:

M-73, June 28: Providing MRO assistance for railroads.

Amendment to Regulation 3, June 29: Extending CMP aid to Canadian defense industries.

Supplement 1 to M-46, June 29: Regulations on the use of allotment numbers for procurement of controlled materials and fabricated items by U. S. and Canadian oil and gas operators.

Amendment to M-14, June 29: Continuing the nickel-conservation order for the third quarter.

Amendment to Delegation 1, June 30: Authorizing the Secretary of Defense to allot controlled materials and apply ratings and allotment numbers.

Supplement 1 to Delegation 13, June 30: Authorizing PAD to reschedule deliveries of controlled materials for the oil and gas industry.

Amendment to M-25, July 1: Providing quotas and preference ratings on the use of cans made of black plate.

Amendment to M-11, July 1: Programming third-quarter production of copper and copper-base alloy products to meet rated orders.

M-74, July 1: Regulating the use of copper and copper-base alloy in construction materials.

Amendment to M-4, July 1: Revising the restrictions on construction.

Amendment to M-12, July 2: Eliminating provisions on the use of copper and copper-base alloys which have been incorporated into other orders.

Distribution Change

Loss of Iranian oil may force readjustment here

WASHINGTON.—A loss of Iranian oil might force a drastic readjustment in our own pattern of oil distribution, President Truman was told last week by Mobilization Director Charles E. Wilson.

Commenting on the petroleum situation in his quarterly report, Wilson declared the possibility of a reduction in the supply of Middle East oil must necessarily be a factor in determining the oil program for this country. He did not, however, give any hint that rationing of residual fuel oil or any other product was in the foreseeable future.

Wilson reported that the expansion program for the oil industry is being pressed vigorously, the urgency of the program being underlined by the world supply-and-demand pattern.

Drilling rises. — The rate of wildcat drilling has risen to a level of 25 per cent above that during the early part of 1950, and oil and gas producers have stepped up their regular drilling operations to substantially above levels last year, he reported. Additional refinery capacity of 1,000,000 bbl. daily has been approved and is under way, and specialized refining facilities to produce military aviation gasoline have been expanded to the point where output of high-octane product is now 55 per cent above the level of a year ago.

Winter worries.—Wilson's report, however, contained nothing to alleviate official concern over next winter's supply situation. Interior Secretary Oscar L. Chapman followed up the mobilization director's recent statement that a voluntary program of fuel stockpiling by all types of consumers during the next 90 days would make a substantial contribution to the defense effort, by asking the governors of all states to designate a member of their staffs to coordinate a program of summer fuel buying by state and municipal agencies and spark a consumer-storage program.

The secretary pointed out that summer stockpiling might avert or minimize the recurrence next winter of the spot shortages of oil, L.P.G., and coal which occurred early this year.

CANADA

Crude Line to Be Built

CALGARY, Alta.—A 20-mile, 6-in. crude-oil line will be constructed by a newly incorporated firm—Edmonton Pipe Line Co., Ltd.—to connect Joseph Lake field with Interprovincial Oil Pipe Line Co.'s main station in the refinery area at Edmonton.

The line will cut to half or less the transport cost between the wells and Edmonton, and increase by around 20 cents per barrel the wellhead value of Joseph Lake light crude. Cost of the line is estimated at $500,000.

Backers include Superior Oils of Canada, Ltd., General Petroleums of Canada, Ltd., Kroy Oils, Ltd., and Jupiter Oils, Ltd.

Drilling Stepup

Ohio Standard will drill 10 wells on Sohio farmout

CLEVELAND. — A 10-well drilling program will be started immediately on leaseholds of Standard Oil Co. (Ohio) in Saskatchewan.

The program will be on a 2,400,000-acre crown-permit land farmout from Sohio Petroleum Co.

E. D. Wallace, vice president in charge of production operations, said here that five drilling rigs will be in operation by July 15, with one of them capable of drilling to 15,000 ft. An extensive seismic exploration program has been planned, he said.

The area to be prospected includes 2,000,000 acres in the northwest sector of the Williston Basin near the International Boundary, 400,000 acres in West Central Saskatchewan situated about 50 miles east of the Alberta boundary, and several scattered localities in Saskatchewan which have been prospected by Sohio during the past 2 years on their government permits. Ohio Standard will earn 1,200,000 net acres or one-half of the gross acreage involved for exploration and drilling.

Farmout to Standard covers a portion of the 9,900,000-acre holdings on which Sohio is now the operator for "The Sohio Group" comprised of itself and six other companies: Republic Natural Gas Co., Dallas; Bradley Producing Co., Wellsville, N. Y.; The Chicago Corp., Chicago and Fort Worth; Union Sulphur & Oil Corp., New York; Midstates Oil Corp., New York and Tulsa; and Texas Gulf Producing Co., Houston.

The Sohio Group owns 8,400,000 acres of crown-permit land and 1,500,000 acres of leased land.

Socony-Vacuum.—A second farmout by The Sohio Group is to Socony-Vacuum Oil Co., Inc.; this agreement comprises approximately 400,000 acres lying north of and adjoining the Ohio Standard holdings. Exploration and drilling will earn 200,000 net acres for Socony-Vacuum.

Texas independents.—A group of independent operators are involved in the third farmout, including J. S. Bridwell, Fain & McGaha, and McCarty & Coleman, all of Wichita Falls. Drilling and exploration will net these participants one-half of 400,000 gross acres.

Denver-Julesburg Play

Four new oil fields discovered in this two-state "hot spot" during the past week; activity at all-time high

STERLING, Colo.—Discovery of four new oil fields last week in the two-state Denver-Julesburg basin marks the greatest impetus the area has received since gas was first discovered there 32 years ago.

Currently there are 15 oil and gas fields producing in an area 100 miles square in southwestern Nebraska and northeastern Colorado. However, the leasing and geophysical play extends all the way from the northwest corner of Kansas to the front range of the Rockies and from Pueblo up past Cheyenne.

New Ohio strike.—Ohio Oil Co., "daddy" of the current development, logged 50 ft. of net effective saturated oil sand last week in the prolific "J" sand to open a new field 6 miles northwest of Gurley field.

The company's 1 Reimers, NE SE SE 15-6n-50w, Cheyenne County, Nebraska, recovered 2,180 ft. of clean oil on a drill-stem test run to a total depth of 4,925 ft. A production attempt will be made through casing this week. Dalton field lies 6 miles to the northeast.

New oil county.—A new oil county for southwestern Nebraska was indicated last week 8 miles southwest of the town of Kimball in Kimball County.

Nebraska Drillers, Inc., 1 F. E. Torgeson, SE NW NW 23-14n-56w, recovered 470 ft. of clean oil and 100 ft. of oil-cut mud on a 60-minute drill-stem test from 6,529-40 ft. Well is bottomed at 6,540 ft. and oil string cemented at 6,525 ft. for completion attempt. Other producing counties are Cheyenne, Deuel, and Banner.

Banner County field.—Second field for Banner County was discovered the past week by Stanolind Oil & Gas Co. The 2 T. D. Lovercheck, NE SE 18-18n-55w, 2½ miles south of Harrisburg field, recovered 50 ft. of clean oil and 190 ft. of oil and gas-cut mud on a 90-minute drill-stem test from 5,890-5,959 ft. in Upper Muddy sandstone. Deeper sands will be prospected before plugging back for completion. Nearby Harrisburg field produces from "Second" Muddy sandstone.

Logan County discovery.—South of this town in Logan County, a new oil discovery was recorded the past week by Ginther, Warren & Ginther, Houston, at 1 State, SW SE SE 20-7n-53w, near the village of Atwood. The "J" sand objective was topped at 4,681 ft. and pay logged from that depth of 4,771 ft., total depth; drill-stem test run from 4,691-97 ft. showed recovery of 1,000 ft. of clean oil.

How it started.—Thirty-two years ago Julesburg basin drew field interest when shallow gas was found near the town of Wray. This village is located in eastern Yuma County near the Colorado-Kansas state boundary line. Midfield Oil Co. drilled four gas wells in the Upper Pierre (Cretaceous) sands found at depths ranging from 1,490 to 1,700 ft.; gas volumes were in the order of 2,000 M.c.f. and rock pressures up to 450 psi. However, the gas supply proved to be limited and the market local, and the field was abandoned within a few years.

Greasewood play.—Reiter-Foster Oil Co. revived the basin play in October 1930. Their 1 Ida Johnson, CNE NW 24-6n-61w, found oil at a depth of 6,639 ft. in the Muddy sandstone; this discovery well produced nearly 250,000 bbl. of oil. Five wells produced on the average more than 100,000 bbl. each.

Denver basin play was revived in October 1942 by General Petroleum Corp. at Horse Creek 21 miles northwest of Cheyenne in Laramie County, Wyoming. Horse Creek was the first geophysical strike in the Rocky Mountain province. Production was found on an anticline mapped by gravity-meter survey conducted in Tertiary-covered beds lying between Wheatland and Cheyenne along the front range. Oil was found in Muddy sand at 5,400 ft. and in Dakota at 5,450 ft.

Ohio finds Gurley.—Ohio Oil's discovery of Gurley field in the summer of 1949 provided the excitement which touched off the current basin development.

Oil was found in the First Dakota sand at 4,396 to 4,437 ft.; the discovery well, 1 M. E. Egging, NE NE NE 11-15n-49w, was completed on July 16, 1949. Initial production was 230 bbl. of 35°-gravity oil per day on pump. While Gurley field did not develop into a major reserve, it led to more prolific fields elsewhere in the basin.

Texaco Bids $1,100 an Acre

SIDNEY, Neb.—Highest bid registered at a sealed-bid sale of Sioux Ordnance Depot tracts in Huntsman oil field 5 miles north of here was $1,110.63 an acre or $533,338.49 offered by The Texas Co. for 480 acres of Nebraska federal lands.

The bid covers lands offsetting two producing wells in Huntsman field; acreage comprised SE 34, SW 35-15n-50w and NE 3-14n-50w. Huntsman field is the largest producing area of any field in Denver-Julesburg basin and produces both gas and oil from "D" and "J" sands of the Graneros-Dakota series.

Issuance of leases covering first two successful bids has been delayed pending disposition of protest filed by Ohio Oil Co. It is understood that the protest claims preference right on basis of previous applications.

Rising Tempo

Staking of two wildcats spurs basin lease buying

ST. FRANCIS, Kans.—Leasing and exploration activity in the new three-state oil play centering around this town in Cheyenne County was accelerated here last week as two rank wildcat wells were staked in Yuma and Washington counties, Northeast Colorado.

The activity, involving northwestern Kansas, southwestern Nebraska, and northeastern Colorado, followed testing of a potential oil discovery near here last month.

Last week Lion Oil Co. was preparing to move in rig materials to drill its 1 Chrismer, SE SW SE 2-2n-48w, on their North Yuma prospect in Yuma County, Colorado. The well will be drilled to 6,700 ft. to the pre-Cambrian rocks. It will be one of the few wells to be drilled to basement rocks on east flank of the vast Julesburg-Denver basin. Seismic exploration was conducted prior to staking of the well.

In Washington County, which lies west of Yuma County, Niloco Oil Co., Dallas, staked location last week for 1 Ward, NW SW SW 31-1s-53w, a rank wildcat 27 miles southeast of Lee pool in Morgan County, nearest field. Niloco has done extensive seismic work in the Julesburg basin in recent months. Commercial production has not been developed in Washington County to date.

Three-state leasing.—Heavy lease block and buying concentration centers around Chase, Dundy, and Hayes counties in the corner of Nebraska lying immediately north of St. Francis.

Sohio Petroleum Co., Oklahoma City and Houston, recently took three blocks in these three counties from A. L. Henson, Denver independent. Continental Oil Co. has acquired a checkerboard spread of 60,000 acres through Dundy County.

Shutdown in Iran

British leaving as field and refinery operations near standstill stage; Iran talks hazy plans for continuing

PRODUCTION, refining, and shipping at one of the world's greatest oil centers at Abadan in Iran have been brought to an almost complete standstill.

With the National Iranian Oil Co. in charge, tanker loadings have been halted, two fields closed down, and the refinery reduced to less than half normal capacity.

Anglo-Iranian Oil Co., Ltd., is now in a full-scale evacuation of its staff. By the middle of this week, it was expected the refinery would be down to a token throughput of around 16 per cent of capacity.

There was nothing to indicate any softening of the determination of the Iranians to take over the British-owned industry at any cost. In some quarters, Iran was already being written off as a source of oil, and substitute supply arrangements are being worked out in New York and in London.

Theft and red tape.—The deteriorating position of the company was reflected in an estimate by Anglo-Iranian officials in Abadan that the equivalent of more than $25,000 of machine parts were now being stolen weekly from field installations.

Iranian officials invalidated passes held by Anglo-Iranian personnel permitting free travel back and forth between Iraq and Iran without visas. The visa held by Eric Drake, Anglo-Iranian's general manager now in Basrah, Iraq, was canceled, and orders were issued not to allow him to return to Iran.

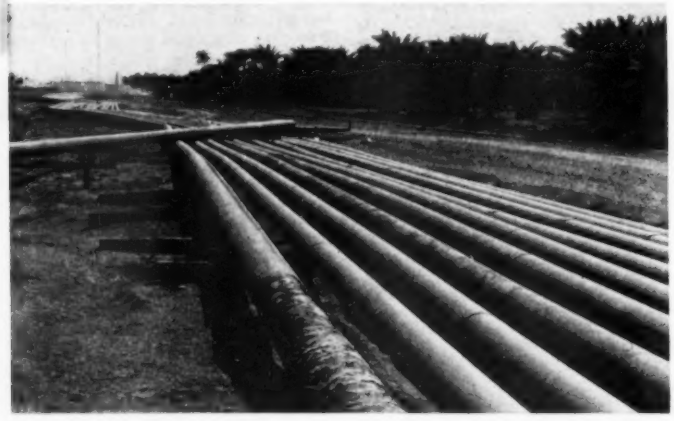
The further cutback in refinery operations this week was to include closing of the catalytic cracking unit. The output was down to slightly above 200,000 bbl. daily, and 6 of the 10 distillation units were shut.

In Teheran, there were disturbances over the week end with street fighting accompanying demonstrations demanding that the nationalization program be carried out without compromise.

The recommendation of the international court for interim operation of the industry by the British were denounced in parliament and in public. Officially, the Iranian Government had a mission studying the court's statement but there was no indication its advice would be accepted. In fact, one report from Teheran said the Iranian Government was planning to appeal to the United Nations on grounds that Britain is making preparations to invade the country by moving troops to Iraq and sending a warship to the Persian Gulf.

Charge filed.—Norman Richard Seddon, Anglo-Iranian's representative in Teheran who had a leading role in the unsuccessful efforts of the British to negotiate a settlement last month, was charged with "illegal activities" in an indictment issued by the public prosecutor's office in Teheran. He was accused of destruction of documents wanted by the government. It was not clear if he is still in Iran.

Hussein Makki, a leader in the nationalization movement, said in an interview in Khorramshahr, that Iranian authorities would put the entire Abadan refinery to the torch if the British so much as landed a single marine.



LESS AND LESS.—These are the pipe lines that carry crude oil from Iran's fabulous oil fields to the world's biggest refinery at Abadan, barely visible in the upper left corner. This week their load was just a trickle compared with the 500,000 bbl. and more normally processed every day at Abadan, and it looked as if they might be idle before long.

Truman Appeals Again

WASHINGTON.—President Truman this week urged the Government of Iran to acknowledge the jurisdiction of the International Court of Justice so that its all-important oil industry may be kept running.

In a message answering one sent him last month by Prime Minister Mohammed Mossadegh, the President, warning that time is running out and a collapse of the Iranian oil industry would be a disaster, offered to send his ace trouble shooter, W. Averell Harriman, to Teheran as his personal representative to talk over the situation.

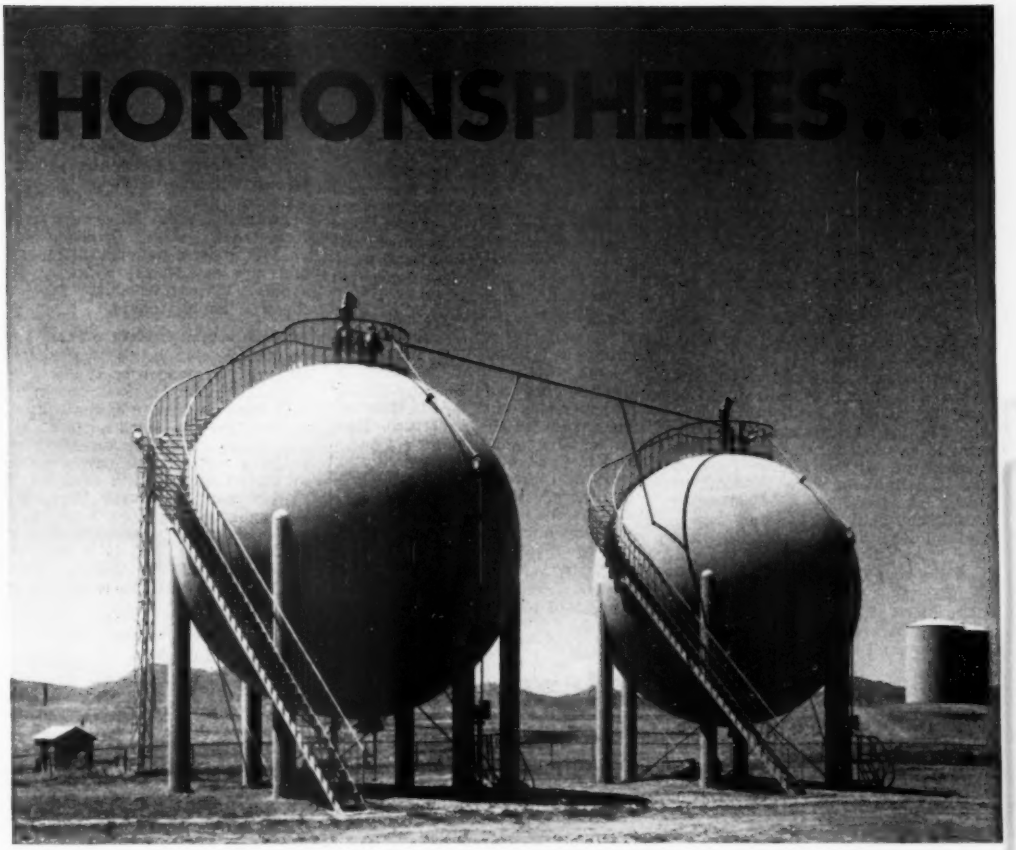
Some British to stay.—Despite the partial closing of the installations, the company early this week made it clear that it now intends to remain in Iran indefinitely and continue some level of operations as long as possible.

The company's Abadan officials received new instructions from London under which plans were made to hold refinery runs at enough to supply domestic Iranian needs and thus keep some equipment working with a greatly reduced staff.

Although the National Iranian Oil Co. is a paper outfit now faced with the impossible task of taking over and running a complex billion-dollar oil property, nationalization leaders talked of making oil sales and holding some level of operations. Elsewhere, it was believed economic chaos in Iran will follow the closing of the country's single largest industry on which about a half million of its 16,500,000 people are directly dependent.

Late last week, more than 800 of the British company personnel had been flown out. Some 480 of the 830 force operating the fields had left, and the Abadan force was down to 1,283 from the normal 1,739.

Operations slowing.—With tanker liftings halted and available storage at Abadan filling, the refinery runs were due this week to drop from about 240,000 bbl. daily to 85,000 bbl. daily. Remaining storage will permit the



Don't Let Profits Disappear into Thin Air

During 1948, the California Company completed a recovery plant for processing natural gas from the Rangely, Colorado, field. The two 2,000-bbl. Hortonspheres shown above are used to store natural gasoline produced at the plant.

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Birmingham, 1.....1536 North 50th St.
Boston, 10.....1025-201 Devonshire St.
Chicago, 4.....2128 McCormick Bldg.
Cleveland, 15.....2204 Guildhall Bldg.
Detroit, 26.....1514 Lafayette Bldg.
Houston, 2.....2119 National Standard Bldg.
Los Angeles, 17.....1523 General Petroleum Bldg.
New York, 6.....3347—165 Broadway Bldg.
Philadelphia, 3.....1615—1700 Walnut Street Bldg.
Salt Lake City, 4.....525 West 17th South St.
San Francisco, 4.....1554—200 Bush St.
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Tulsa, 3.....1606 Hunt Bldg.
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plant to continue under the further reduction for a few more weeks, and then there is every indication the rest of the British force will leave.

Of the six main fields which ring Abadan to the north and east, Gach Saran and Agha Jari were already shut down. Agha Jari, which has had a production in excess of 350,000 bbl. daily, supplies the crude pipe line which carries about 100,000 bbl. daily to the secondary loading point at Bandar Mashur.

This 20-22-in. pipe line was laid about 2 years ago with steel obtained from the United States. Many of the production staff also had been withdrawn from Masjid-i-Sulaiman where the company made its first discovery in 1908.

Even though some Iranian patriots now are beginning to realize the full level of operations cannot be continued without British assistance, they seem to be prepared to carry on at a reduced rate. It was said in Teheran that the Iranians were thinking in terms of possibly 4,000,000 tons (80,000 bbl. daily) at the start, possibly building up to 10,000,000 tons later. Anglo-Iranian's production in Iran this year has been about 700,000 bbl. daily.

Dr. Mario Caraffa, an official of Azienda Generale Italiana Petroli, Italian state oil company, has been in Teheran, reportedly conferring with the Iranians on their nationalized operation. One report was that AGIP had offered to buy part of its crude requirements from the Iranians.

Price-cut talked. — If there is difficulty moving the oil, the Iranians have in mind to cut the price and dump it on the market. This step would undoubtedly attract some small European buyers and possibly state owned companies, but the large international companies which control by far the greatest part of world markets in all probability would ignore such an offer.

One member of the temporary government mission which has been moving in to take over the properties at Abadan gave a report to the Majlis, or lower house, of the Iranian Parliament last week. He asked parliament to authorize sales at below-prevailing prices in order to attract customers and said that Iran was prepared to cut 3 per cent off the world price.

At present, the ruling Persian Gulf price is $1.75 for 36°-gravity crude. Whether $1.70 would be low enough to attract any rush of buyers is problematical. Considering present tanker rates, the price would have to be cut much more drastically in order to make the crude competitive in the United States.

Abadan was taking on some of the appearances of a ghost city. No tankers have entered the once-busy port since June 22, and the British staff houses were becoming more and more deserted as the evacuation proceeded. Alec Mason, acting general manager of the company at Abadan, sought and failed to obtain a conference with members of the Iranian mission to discuss plans for closing down the producing operations.

Interference increasing.—At Abadan and in the fields, there was increasing interference with company personnel, even though it was plain they were leaving and ready to turn over the installations in working order. The company was prohibited from operating its airplanes from Abadan to Basrah on grounds they belonged to the National Iranian Oil Co.

Barges to Basrah also were stopped, and Iranian port authorities refused to allow water and other supplies to be taken out for the British warship. Military police were opening household goods and other effects that had been crated for the departure. Mail was held up, and soldiers set up a guard to inspect everything entering or leaving the refinery area.

In Teheran, the company's information director, Philip Stockhol, left the country hurriedly by airplane after it was learned the government was considering prosecuting him.

Earlier, Iranian authorities raided the home of Norman R. Seddon, the company's Teheran representative, and seized his papers.

Two more appeals.—Two other Asiatic nations, India and Indonesia, have asked Iran to use moderation, but this and other foreign pressure, such as the World Court recommendation and statements by President Truman and Secretary of State Acheson, seem to only heighten the feeling over the issue in Iran.

Iranian leaders have apparently forgotten the recent British offer to operate under a national oil company and now say they are prepared to sacrifice the entire industry "to burn the oil," before yielding.

Domestic supply threat.—There were predictions that Iran's own domestic oil supply may soon be stopped.

Local Iranian oil needs are met in part from production of the Kermanshah refinery operated north of Abadan by an Anglo-Iranian subsidiary. Soldiers with fixed bayontes surrounded the plant and confined the British manager, Derek Hobson, to his home.

The plant has a capacity of about 2,100 bbl. daily, and if it is closed, one source said in Teheran, every gasoline pump in Iran would be dry in 2 months.

If Iran Is Lost....

Results of complete shutdown will be serious, but not fatal; here's what to expect as world meets oil deficit

Dahl M. Duff

NEW YORK.—If the British evacuate Iran and this source of oil is lost for good, look for the following to happen:

1. A speedup in the construction of refinery projects now under way in the Eastern Hemisphere.

2. Sharp curtailment of the 200,000 bbl. daily and more of crude now being shipped from the Middle East to the United States and Canada.

3. Marked increase in exports of products from the United States.

4. A temporary surplus of tankers, with the market tightening again as new supply and distribution arrangements are effected.

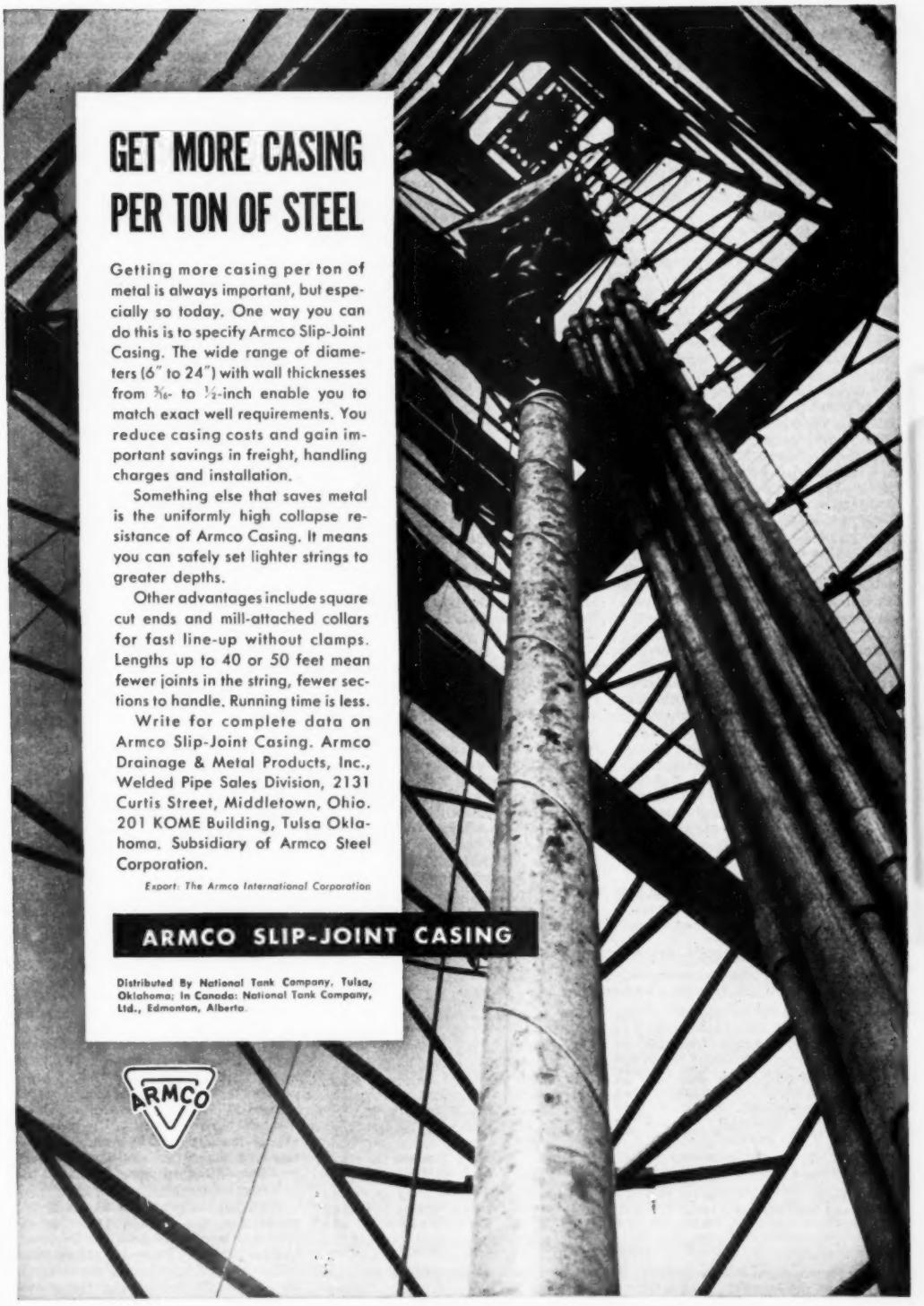
These are some of the more obvious results anticipated from measures being adopted by the industry to offset an anticipated complete shutdown in Iran. There is no reason to expect any disastrous breakdown in the supply of oil, even though in one way or another the loss of Iran's oil will be felt by every important producing and consuming area in the world.

One broad result will be to place much of the international petroleum trade under coordinated control and government-sponsored directives, similar to the way in which the foreign industry operated during the war. Authorization for such joint action by American companies has been given by the Department of Justice, and the first meeting of the industry committee organized under the Petroleum Administration for Defense was held last week in New York.

The British companies, principally Royal Dutch-Shell and Anglo-Iranian Oil Co., Ltd., laid plans for emergency action after the April shutdown at Abadan. With the entire Iranian operation now on the verge of complete closing, American and British action is now being coordinated and placed in effect. Emergency exchanges are being made at present, pending approval of the long-range plans.

Replacement problem.—If the Iranians believe their oil is entirely irreplaceable, they are due for a surprise. Although no one expects that 700,000 bbl. daily can be dropped out of world supply without severe repercussions, the loss will not be fatal. Most of the difficulty will come about in the first 6 months.

It is fairly well recognized in the industry that the problem of replacement is not so much that of crude oil as it is refined products. The Abadan refinery represents about one-eighth of the total capacity of the



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non-Communist world outside the United States. This mammoth installation had almost as much throughput as the entire increase provided by all foreign refinery construction and expansion last year.

Extra-crude sources. — Kuwait and Saudi Arabia will be called on to make up much of the deficit in crude oil. Both these areas are believed capable of great and fairly rapid expansion in output.

Drilling in Kuwait has been restricted by market demand for the oil, and a recent British Government document made the unqualified statement that Kuwait's reserves are greater than those of Iran. The port of Kuwait has one of the world's largest loading docks, completed about a year ago, and other oil-handling facilities presumably would take care of a quick increase in production.

Some additional crude also probably could be obtained on short notice in Qatar, now producing about 50,000 bbl. daily. About 275,000 bbl. daily will be provided from Iraq when the new 30-32-in. pipe line to the Eastern Mediterranean is finished, and another 40,000 to 50,000 bbl. daily is to be moved out of the new field in the Basrah area early next year. The 30-32-in. from Kirkuk is not due for completion until the latter part of 1952, but intensified construction activity is a possibility.

Refining answer.—One of the first steps taken in the planning against an indefinite shutdown at Abadan after the strikes in April was a survey of excess refining capacity that might be available in existing plants. Exactly how much was turned up is not known, but it is said to be considerable. A total of 125,000 bbl. daily in the United Kingdom and Europe has been mentioned. There is another 70,000 bbl. daily or so idle at Haifa, but prospects of economically using it are slight because of shutoff of crude from the Arab world.

There is now approximately 400,000 bbl. daily refining capacity under construction or definitely planned in the Eastern Hemisphere, not including minor projects and exclusive of the Communist countries. Almost all of this is in Europe. The position in some individual countries will be better than in others. Jersey Standard's Fawley refinery is to go on stream in the next few months. This 126,000-bbl. daily plant, which incidentally was originally intended to operate largely on sterling crude from Iran, will more than make up, in total, products which Britain received from Abadan.

Abadan's customers.—Of Britain's total imports of motor fuel last year of some 95,500 bbl. daily, about 19,100 bbl. daily came from Abadan. Iran also supplied 10,100 bbl. daily of Britain's 30,300 bbl. daily of kerosine, about 500 bbl. daily of the 28,800 bbl. daily of gas oil, and 21,400 bbl. daily of the 45,000 bbl. daily of fuel oil. The United Kingdom imported 186,000 bbl. daily of crude, with about 47,500 bbl. daily coming from Iran.

A large part of Abadan's production moved to the east-of-Suez region, that is, to the countries of Southeast Asia such as India and Pakistan. This area will be hit hardest by the interruption of Iranian shipments. India, for example, received about 60 per cent of its motor fuel from Iran. Abadan's kerosine production was widely marketed in Asia through Anglo-Iranian's own organization as sales to other companies.

Makeup pattern.—In reorganizing the pattern of the oil trade, one of the first steps will be the diversion of virtually all the production of the remaining two important Persian Gulf refineries, at Ras Tanura and Bahrein, into this Southeast Asia area. Products now being moved into Europe from the Middle East will be turned into these nearer markets.

Loss of the Abadan plant and the necessity of replacing this capacity as quickly as possible will place a premium of speedy completion of current refinery construction in the Eastern Hemisphere. Every effort will undoubtedly be made to bring the larger plants into operation as quickly as possible. This will call for high priorities on necessary materials.

However, even with maximum utilization of existing surplus capacity abroad and the earliest possible completion of new refinery projects, the Eastern Hemisphere and Europe will still be left with some deficit in products supply. Much of the crude now being moved to the United States and Canada from the Middle East will be needed to maximize throughput in Eastern Europe, and this traffic will probably decline. The United States alone has been importing about 140,000 bbl. daily of Persian Gulf crude, all from Kuwait and Saudi Arabia.

Total Middle East crude production has been slightly above 2,000,000 bbl. daily. Less Iran, this amounts to about 1,300,000 bbl. daily. Refineries at Bahrein, Ras Tanura, and Kuwait take approximately 350,000 bbl. daily. Western Europe's total refining capacity is now approximately 1,000,000 bbl. daily.

British view.—British industry leaders are now talking in terms of meeting approximately half the gap resulting from the loss of Iran by emergency measures within the Eastern Hemisphere — maximizing runs even at some sacrifice of preferred yield, withdrawals on stocks, and other readjustments. The remainder would be made up by exports from the United States, the Caribbean area, and other parts of the Western Hemisphere. This additional quantity needed is on the order of 300,000 bbl. daily, and the burden of supplying much of it will fall on the United States.

The product which made up the largest part of Abadan's production—fuel oil—is also the product which is imported in greatest volume into the United States. Fuel-oil imports to the East Coast of the United States come mainly from the Caribbean refineries at Aruba and Curacao. There is little, if any, spare refining capacity in the Caribbean area, and diversion of some of this fuel oil to relieve the shortage in the Eastern Hemisphere will tighten the American market.

One of the expedients reported being recommended to PAD is a plan for converting East Coast factories and other fuel-oil users to coal where possible. Whether this would be politically possible is a serious question.

When the Iranian Government's demand for tanker receipts halted shipments from that country, British companies started buying cargoes of products of all types in the United States market. Greatest difficulty has been experienced in finding aviation gasoline and heavy fuel oil. The aviation-gasoline situation was described as "utterly hopeless."

With an indefinite halt in Iran's production, the outlook is for accelerated shipments of products from the United States. This, in effect, will utilize available refining capacity in the United States to meet the short-

IRANIAN EXPORTS—FISCAL YEAR ENDED MARCH 20, 1950

Country or area—	Total		Crude		Products	
	Bbl./day	Per cent	Bbl./day	Per cent	Bbl./day	Per cent
Europe:						
United Kingdom	159,258	35.9	31,131	37.9	128,127	35.4
France	11,258	2.5	8,773	10.7	2,485	0.7
Italy	7,742	1.8	2,274	2.8	5,468	1.5
Netherlands	6,384	1.4	696	0.9	5,688	1.6
Belgium	6,044	1.4	1,660	2.0	4,384	1.2
Spain	2,732	0.6			2,732	0.8
Germany	1,603	0.4	164	0.2	1,439	0.4
Others	37,619	8.4	4,479	5.4	33,140	9.1
Total Europe	232,640	52.4	49,177	59.9	183,463	50.7
Africa	59,704	13.5	1,101	1.3	58,603	16.2
Middle East	51,734	11.7	1,627	2.0	50,107	13.9
Far East	51,345	11.5	1,135	1.4	50,210	13.8
Latin America	28,408	6.4	27,770	33.8	638	0.2
Australia and New Zealand	14,068	3.2	964	1.2	13,104	3.6
Other	6,244	1.3	312	0.4	5,932	1.6
Total	444,143	100.0	82,086	100.0	362,057	100.0

Source: International Petroleum Trade, Vol. 20, No. 4, page 60, published by the U. S. Department of the Interior.

age abroad. Withdrawals on stocks will be of immediate assistance, but a sharp increase in domestic refinery runs will call for stepped-up crude imports and possibly a still greater allowable in Texas.

This is expected to be the situation over the next year or two until new refinery capacity comes into operation, crude production fully developed, and changes in the pattern of the international oil trade worked out. Wherever possible, uneconomic movements, such as the shipment of Persian Gulf oil to Argentina, will be eliminated.

Aramco Affirms Discovery

Arabian American Oil Co. has confirmed the discovery of oil in its offshore well, Safaniya 1, in northern Saudi Arabia.

The company said the oil was discovered in the Bahrein zone, the zone from which production is obtained on Bahrein Island and in Burghan field in Kuwait. The well is located approximately 13 miles south from the port of Ras Misha'ab and about 12,000 ft. offshore in the Persian Gulf. It is the first offshore test drilled in the Persian Gulf.

From preliminary drill-stem tests, it has been determined that the oil is sweet and of medium gravity. Operations are continuing at the well and it is planned to core through the producing horizon. Productivity of the well and the extent of the new field are unknown at present.

EUROPE

Oil-Alcohol Plant Operating

Alcohol from petroleum is now being produced in England at the new plant of British Petroleum Chemicals, Ltd., jointly owned by Anglo-Iranian Oil Co. and Distillers Company, Ltd.

The new plant is adjacent to the Grangemouth refinery of Scottish Oils, Ltd., an Anglo-Iranian subsidiary, and its feed stock is naphtha from the gas-fractionation system of the refinery's basic cracking unit.

The plant separates ethylene and propylene, returning other products to the refinery. Ethyl alcohol is produced by the process of Shell Development Co., and propyl alcohol is produced by a process developed by Distillers Co. which employs absorption of propylene by sulfuric acid which is then hydrolized by dilution with water.

Heretofore British production of ethyl alcohol was based chiefly on distillation of molasses. The new plant later will supply ethylene feed stock for the manufacture of ethyl benzene and monomeric styrene at a plant now under construction nearby by Forth Chemicals, Ltd., jointly owned by British Petroleum Chemicals and Monsanto Chemicals, Ltd.

Benzene Deal Completed

An agreement between the United States and the West German Government has been concluded under which this country will obtain 25,000 tons of German benzene annually. It has been reported that 6,000 tons of the product is already en route to this country.

Under the agreement the United States will ship to West Germany, in return for the German benzene, approximately 75,000 tons of high-octane motor fuel. The deal was consumated at the request of the U. S. Rubber Reserve.

Benzene has been in short supply in both the United States and Germany and release of this sizable amount to the United States was agreed to only in the interest of the defense program.

German production is only about 9,000 tons monthly and the West German Government will take a substantial part of this.

Sulfur Extraction Planned

Plans to incorporate a plant for the extraction of sulfur at the new Fawley refinery in England have been announced by Esso Petroleum Co., Ltd., in London.

Work on the new sulfur plant will start in the near future, and when completed early in 1953, it is expected to produce about 12,000 tons of 95.5 per cent chemically pure elemental sulfur a year.

The new refinery has been designed to extract from crude oil the maximum quantity of sulfur econmically available in the refining process and at the same time to use as little sulfur as possible in its various treating units.

The Fawley refinery with a capacity of about 126,000 bbl. daily will be the largest in Europe. It is expected to go into initial operation within the next few months.

FAR EAST

Philippine Refinery Planned

Production developed in Central Sumatra by California Texas Corp. will be processed in a refinery to be built by Caltex in the Philippines.

Refining of nearby crude in that area is expected to effect substantial savings in tanker transportation, according to R. G. Follis, chairman of the board of Standard Oil Co. of California, which owns Caltex jointly with The Texas Co.

Follis said the new source of Indonesian oil, together with the Philippine refining facilities, will relieve the dependence of the Far East upon Persian Gulf production.

Caltex does not plan to build a refinery in Sumatra, as has been reported.

LATIN AMERICA

New Discovery

Mexican American's Rabon Grande test is successful

AN apparent new field discovery has been made by Mexican American Independent Oil Co. in its test at Rabon Grande in Veracruz.

In a statement in Mexico City, George Calleya, local manager of CIMA, said the new well tested 225 bbl. daily and that bottom-hole pressure tests indicate a good commercial producer.

The No. 2 well was to have been commenced early last week at a location about 200 yd. west of the discovery site. The program calls for completing the second well within 3 weeks, Calleya said. CIMA is now moving a second rig to the Rabon Grande area.

The Rabon Grande was reported to have been completed at about 2,300 ft. The well was drilled to total depth of 3,455 ft. An upper productive sand was found at about 2,211 ft., and 7-in. casing set to 2,793 ft.

Pipe line.—It was reported in Mexico City that Petroleos Mexicanos will lay a line from Rabon Grande to its Nanchital tank farm which is connected with the Minatitlan refinery in Veracruz. CIMA, owned by American Independent Oil Co., Petrofina, and E. W. Pauley, holds a percentage-of-production contract with Pemex.

The company earlier drilled the Xicalango and Tortuguero structures. Gas was found at Xicalango, and Pemex is planning to lay a 12-in. gas pipe line from the area to Cuidad del Carmen in Campeche. CIMA expects to spud in its Tecominuacan location in Tabasco early in July.

Cuban Agency to Buy Rig

The National Development Commission of Cuba is planning to buy a drilling rig as a part of its program to encourage exploration of the island's mineral resources.

The commission has announced it is interested in receiving information on equipment capable of drilling to a depth of 10,000 ft. The equivalent of $500,000 has been appropriated for the project. Offers should be addressed to Jose Menendez Menendez, Comision de Fomento Nacional, Calle 21, No. 811, Vedado, Habana.

The commission plans to make the rig available on a rental basis to firms lacking sufficient funds to carry on exploration without government assistance. Cuba now has production of a few hundred barrels daily, and a Gulf subsidiary is drilling an offshore test from a platform on Cuba's north coast.

PERSONALS

Production Veteran

Damp started with Jersey Standard as bottle washer

RALPH DAMP started his career with the Standard Oil Co. (N. J.) organization in August 1926 in the Tulsa laboratories of Carter Oil Co. As other young chemists fresh from college have done, he broke in washing bottles.

After 18½ years with Carter and a tour of duty in Latin America, Damp was moved into New York on the producing-coordination staff of the parent company. He now handles South American matters as an executive assistant in the producing-coordination department.

Born in 1905, Damp attended grammar school in Mercer County, Illinois, and high school in Aledo, Ill. He was graduated in 1926 from University of Minnesota with a degree in chemical engineering, and went to Oklahoma that summer partly as a result of a letter from a friend who had graduated earlier.

Damp held a variety of jobs on the producing side with Carter. In the late twenties he was in natural-gasoline operations, first in the Seminole area and later elsewhere in Oklahoma. He served as division petroleum engineer and division engineer for northern Oklahoma and Kansas, and was active in the water-flooding program for Nowata from 1933 to 1935. In 1937, he was shifted to Illinois as production superintendent, and 4 years later, to Montana where he was division superintendent and division manager at a time when Carter was first expanding into refining and marketing in that region.

In 1944, Damp returned to Tulsa as acting general production superintendent, and subsequently general production superintendent of the company. In December 1944 he left Carter to become production manager of Standard Oil Co. of Cuba, which at the time, was engaged in an active exploratory program in that country. Two years later he was brought back to New York to join the producing-coordination staff.

Arthur L. Bergren, formerly with Pure Oil Co., and **Weldon Grennen,** Corpus Christi, have joined the Denver geological staff of Lion Oil Co.

W. B. Gilmore, Chicago, a member of Pure Oil Co.'s executive production staff for more than 30 years, has resigned to become an independent exploration consultant, with offices in Chicago.

Everett C. Coville has assumed duties of division material man of the Rocky Mountain producing division for Pure Oil Co., Billings, Mont. He has been with the company since 1926, and transfers from the Texas producing division.

M. W. Conn, assistant manager of the market-development division of Phillips Petroleum Co.'s research and development department, has been appointed manager of the division, succeeding **C. C. Crawford,** who has resigned to enter private business.

M. E. Michael, development foreman of Phillips Petroleum Co.'s Gulf Coast production division, has been appointed district superintendent at Beaumont, Tex., succeeding **H. M. Bell,** who has resigned.

M. D. Abel has resigned as district engineer for Plymouth Oil Co., and has joined B. B. M. Drilling Co. as chief engineer, with headquarters in Midland, Tex. **Neal Taylor** will serve as acting district engineer for Plymouth. **Wendell Cook,** with Plymouth at the Benedum gasoline plant, has been transferred to Susan Peak field, where he will work in the company's engineering department on repressuring and gas-lift problems.

J. D. Castnec has been transferred from Owensboro, Ky., to Oklahoma City as district engineer for Sohio Petroleum Co.

E. Darrell Williams, consultant, has moved from Lander, Wyo., to Houston, where he will establish offices to engage in general oil exploration.

L. C. Bodemann, Jr., junior petroleum engineer for British-American Oil Producing Co., has been transferred from Tulsa to Houston.

A. Dale Greene, vice president of United Gas Pipeline Co., Shreveport, has been appointed director of the Petroleum Administration's gas-operations division, serving without compensation.

Parker S. Wise has been appointed to the newly created position of assistant general manager of the marine-transportation department of Socony-Vacuum Oil Co., Inc., New York City. He succeeds **Herbert A. Steyn, Jr.**

David S. Frank, manager of Pure Oil Co.'s Toledo refinery, will move to Chicago as assistant manager of the refinery technical department, where he will specialize in the field of utilities. **Hal H. Dronberger** will succeed Frank as manager at Toledo, moving up from the position of general superintendent. Other changes at Toledo include: **William S. McConnor,** superintendent of construction and maintenance, named to succeed Dronberger as general superintendent; **Victor H. Trumpy,** general operating foreman, named superintendent of operations; **Willard G. Dailey,** Heath refinery, Newark, Ohio, named superintendent of maintenance and construction; and **Jack Allen,** Heath refinery, named staff assistant at Toledo.

John R. Suman, senior vice president of Standard Oil Co. (N. J.), has been named director-at-large of the U. S. Chamber of Commerce. Suman has been a member of the chamber's natural-resources committee for the past 2 years.

John M. Clayton has been named Mid-Continent division chief geologist for Seaboard Oil Co., with headquarters in Dallas. He has been succeeded as assistant chief geologist by **Earl E. Westmoreland,** formerly district geologist in southern Oklahoma. Other changes include: **W. H. Cardwell,** formerly Dallas supervisor of the South Texas district, promoted to coordinator of land and geology, Dallas; **Mack E. McCann,** formerly assistant district geologist, promoted to district geologist, Corpus Christi; **Meryl Williams,** formerly staff geologist, Dallas, promoted to district geologist in charge of southern Oklahoma, Ardmore; **Roy Benke,** promoted from staff geologist to supervisory geologist, Dallas; **Bruce Pearson,** promoted from junior geologist, Midland, to assistant district geologist, Corpus Christi; **S. J. Taylor,** supervisory geologist for the Midland district, now also supervisory geologist for the Abilene district, with offices in Dallas; and **Norman Walker,** formerly geologist in the Midland district, promoted to district geologist in charge of Central Louisiana, Alexandria.

PERSONALS

W. A. Alexander, manager of Shell Oil Co.'s Tulsa exploration and production area; **Joe T. Dickerson,** manager of the Midland, Tex., area; and **B. Dykstra,** manager at New Orleans, have been elected vice presidents of the firm. Alexander, a graduate of Louisiana State University in 1928, joined Shell at White Castle, La., as a district field engineer. In 1935 he was named exploitation engineer in the production department, Gulf Coast division, and 4 years later became chief exploitation engineer at Houston. In 1944 he was named acting production manager at Houston and in November 1946 area manager there. He was named to the post of Tulsa area manager in 1947. Dickerson only last month assumed his duties as manager at Midland. He has been with the firm 23 years and has held various assignments in Tulsa, St. Louis, New York, and Houston. He became manager at Houston in May 1947, holding that position until his transfer to Midland. Dykstra formerly served as manager at Midland before being moved to New Orleans.

W. A. ALEXANDER

R. R. Freeman, production superintendent at Hoisington, Kans., for Carter Oil Co., has moved to Sayre, Okla., to handle work in the new Northeast Mayfield area.

E. T. Heck has joined Minard Run Oil Co., Bradford, Pa. He will be in charge of geology and engineering. He formerly was in the Bradford production office of Quaker State Oil Refining Corp.

B. E. Groenewold has been appointed manager of Exploration Drilling Co., Tulsa. He formerly was chief engineer and assistant manager. **Bruce Harp,** formerly Mid-Continent area drilling superintendent, was named assistant manager, with offices in Midland, Tex., and **C. J. Matthews** has been named Rocky Mountain drilling superintendent, with offices in Riverton, Wyo.

Herbert E. Fisher, supervisor of planning for Service Pipe Line Co., Tulsa, has joined Crutcher, Rolfs, Cummings, of Houston, as head of that firm's engineering department.

George F. Henry, formerly assistant superintendent of The Texas Co.'s Lockport, Ill., refinery, has been transferred to the company's managerial office in New York. He is succeeded by **E. W. McNealy,** who was assistant superintendent at Eagle Point, N. J. **M. F. Granville** succeeds McNealy at the Eagle Point Works, and at the same refinery **J. A. Caviezel** is now superintendent of operations.

Robert D. Gordon, Jr., has been appointed chief geologist of Ashland Oil & Refining Co., with offices in Oklahoma City.

George F. Fitzgerald, supervisor of specialties at Socony-Vacuum Oil Co., Inc.'s Olean, N. Y., refinery, will succeed **Ben L. Harris,** assistant superintendent, on his retirement September 1.

William S. Hill, petroleum engineer in the Beeville, Tex., district for Union Producing Co., has been transferred to Houston as district petroleum engineer. A graduate of University of Texas, Hill was employed in the engineering department of United Gas Pipe Line Co. in 1938, and joined Union Producing Co. at Shreveport in 1941.

Charles C. Deano has been appointed executive vice president of Victory Oil Co., Inc., New Orleans.

Frank C. Perkins, field engineer at Crane, Tex., for Gulf Oil Corp., has been transferred to Fort Worth as petroleum engineer in the reservoir division.

Lloyd Wells, construction superintendent for Skelly Oil Co.'s manufacturing department at Skellytown, Tex., where he supervised construction of the firm's Crawford gasoline plant, is now at Eunice, N. M., supervising the erection of Skelly's No. 2 gasoline plant.

Joseph W. Jackson, Sinclair Oil & Gas Co., has been transferred from division headquarters at Denver to the Nebraska district as geologist, with headquarters at Scottsbluff, Neb.

Robert L. Geyer, formerly instructor in structural geology and geophysics at the School of Geology, Louisiana State University, Baton Rouge, has joined Stanolind Oil & Gas Co. as a research geophysicist at Tulsa.

George Gibson, formerly with Seaboard Oil Co.; **Alan B. Leeper,** recently resigned as assistant manager of exploration in the Permian basin for Honolulu Oil Corp.; and **Tom Cole,** formerly with Kerr-McGee Oil Industries, Inc., in the basin and the Rocky Mountain area, have organized the firm of Gibson, Leeper & Cole, geological consultants, with headquarters in Midland, Tex.

R. D. White, formerly division exploration superintendent of the western division at Denver for The California Co., has been appointed division exploration superintendent for the new southeastern division established at Shreveport. **L. I. Brown** was appointed manager of geology in New Orleans on the staff of the vice president of exploration. **C. H. Ramsden,** formerly assistant division superintendent of the western exploration division, has been made western division superintendent, headquarters remaining at Denver. The following additional appointments were made: **A. L. Morgan,** named division geologist, southern division at New Orleans; **R. L. Levorsen,** named district exploration superintendent for the new West Louisiana district headquartered at New Orleans; and **J. J. Crouere,** appointed district exploration superintendent for the new East Louisiana district with headquarters at New Orleans.

Warren A. Sinsheimer, vice president of Petroleum Advisers, Inc., Cities Service Co. affiliate, has been appointed petroleum-economics coordinator, a new company activity, and will direct broad economic studies within the petroleum industry and long-range plan of petroleum subsidiaries and departments which will be coordinated for consideration by chief executive officers and directors of the parent company. Sinsheimer is a veteran production and refinery man, having started in the oil business in California. He joined Cities Service in Oklahoma in 1927 in the production and engineering department. He is also vice president and director of Cities Service Petroleum Co. and Cities Service Pipeline Co.; and director of Empire Gas & Fuel Co., Arkansas Fuel Co., and Arkansas Pipeline Co.

Walter H. Aldridge has been elected chairman of the board of Texas Gulf Sulphur Co., and **Fred M. Nelson** has been named president. Aldridge has been president of the company since it began operations 32 years ago, and Nelson has been in charge of the company's field operations since he joined the firm in 1927. From 1945-50 he was executive assistant, concerned chiefly with sour-gas investigations.

Wallace L. Hammer, Greggton, Tex., has joined Stanolind Oil & Gas Co. as junior petroleum engineer at Odessa, Tex. **Dan Alan Bee,** of Lub-

PERSONALS

bock, Tex., has joined the firm as a petroleum-engineer trainee at Monahans, Tex.

Joseph K. Silvernail, director of purchasing for the Atlas Works of Socony-Vacuum Oil Co., Inc., at Buffalo, has been elected president of the Buffalo Purchasing Agents Association.

Ed Gribi, geologist at Hanford, Calif., for General Petroleum Corp., has been transferred to King City, Calif., in the same capacity.

J. L. Briscoe, superintendent at Artesia, N. M., for Roland Rich Wooley, has transferred to Loco Hills, N. M.

Stanley O. Hutchison, formerly a student at University of California, has joined Standard Oil Co. of California as a junior petroleum engineer at Taft.

Austin Groeneman, formerly utility man at Satanta, Kans., for Magnolia Petroleum Co., has been transferred to Premont, Tex., as field engineer.

Gus E. Howell, tool pusher at Robert Lee, Tex., for Penrod Drilling Co., has been moved to Saline Lake, La., in the same capacity.

Orris E. Carter, training supervisor for Interstate Oil Pipe Line Co., Tulsa, has joined Creole Petroleum Corp. in that capacity, and will leave this month to take up his new duties in Caracas, Venezuela.

Kenneth Webb has resigned as district geologist for Deep Rock Oil Corp. at Sterling, Colo., and will open offices there as a consulting geologist.

George H. Calhoun, construction engineer for Shell Oil Co. at Houston, has been moved to Wichita as division mechanical engineer.

Ben W. Sewell, Carter Oil Co. research engineer, has resigned to form the firm of Sewell Products Co., Tulsa. He had been with Carter for 16 years.

Raymond Chorney, senior geologist for Union Oil Co. of California at Midland, Tex., has joined Wilshire Oil Co., Inc., as district geologist and manager in the newly opened Rocky Mountain district offices in Casper, Wyo.

Dr. George V. Cohee, senior geologist in the fuels branch of the United States Geological Survey in Washington, D. C., has been appointed professor and chairman of the department of geology at University of Arkansas at Fayetteville. He succeeds **Dr. Albert William Giles.**

Walter G. Appleby, formerly senior technologist in the New York offices of Shell Oil Co., has been transferred to Shell Development Co. as research chemist in colloid chemistry.

C. R. Nelson, Jr., M. L. Courter, and **M. E. Stromsmoe,** chemical engineers with Shell Development Co., Emeryville, Calif., and **R. B. Hanning,** Shell Chemical Co., Houston, have gone to Grangemouth, Scotland, for the beginning of operations of the new, multimillion-dollar, synthetic ethyl alcohol plant built under Shell license.

Leslie M. Clark, formerly chief geologist in Canada for Seaboard Oil Co., has resigned to join Pacific Petroleums, Ltd., as vice president in charge of exploration, with offices in Calgary.

D. M. McBride has been elected president of the new Plains Pipe Line Co., which is jointly owned by Phillips Pipe Line Co. and Cities Service Oil Co. The new firm will operate a trunk carrier and gathering system now under construction in the Spraberry trend of West Texas, and will tie into existing major trunk lines in the Permian basin. **W. H. Wallace** has been elected vice president and manager of the new firm.

W. E. Richards, district petroleum engineer for Humble Oil & Refining Co. at Pleasanton, Tex., has joined Rock Hill Oil Co. at San Antonio as petroleum engineer.

J. M. Gardner has been appointed vice president in charge of drilling operations of Delta Gulf Refining Co. He will assume his new office on July 15, the effective date of his resignation as vice president and general manager of the Ideco division of Dresser Equipment Co. He will maintan an office in Dallas, in addition to an office at Delta headquarters in Tyler, Tex.

Otis B. Long, McKay Cooper, and **A. R. Valentine,** all field gagers for Interstate Oil Pipe Line Co., have been promoted to district gagers. Long is located at Magnolia, Ark., and replaces **J. W. Tanner,** who retired in March. Cooper transfers from Magnolia field to Pickens field, Mississippi; and Valentine headquarters at Brookhaven, Miss.

DEATHS

Arthur Anderson Garrabrant, 61, vice president and general manager, foreign sales, of Atlantic Refining Co., died and was buried at sea July 1 en route from Lisbon, Portugal, to Rio de Janeiro. He had been a vice president since 1937 and a member of the board since 1941.

Joe J. Bryan, 45, division geologist for Union Oil Co. at Bakersfield, Calif., died there July 3. He had been with Union since 1944. He was president of the San Joaquin chapter of the American Association of Petroleum Geologists at the time of his death.

C. B. Jetter, 70, pioneer wildcatter and producer, died July 4 at Big Rapids, Mich. Jetter entered the oil industry in Pennsylvania in 1902 and is credited with discovering the Wimot pool, Archer County, Texas.

Benjamin Franklin Holmes, 63, a partner in Shamrock Gas Co. until his retirement 2 years ago, died July 6 at Shamrock, Tex.

Herman F. Steffens, 78, oil lease broker at Claremore, Okla., died there July 8.

Roy B. Thompson, 66, Tulsa oil man and Oklahoma rancher, died in Las Vegas, N. M., recently. After oil was discovered on his ranch in 1921 he founded and operated the Thompson Brothers and Minshall oil partnership.

John Kennedy Finlayson, 64, retired Tulsa oil man, died there July 3. He moved to Tulsa in 1910 and was associated with his father in Finlayson Tool Co. He was an independent oil man and was owner of Finlayson Drilling Co.

J. C. Hawkins, 58, Dallas oil man and vice president of Delta Gulf Drilling Co., died in Dallas July 3. His oil interests extended from Mississippi to California.

Benjamin Oliver Flowers, 53, assistant foreman at Lone Star Gas Co.'s Pueblo station, died July 2 in Moran, Tex.

Frank D. Jones, treasurer of Superior Oil Co. for the past 25 years, died June 29 at Houston.

B. G. von Roeder, 71, engineer and independent oil operator, died July 5 at El Campo, Tex.

Wilbur S. Leake, 66, who recently had started his own business as a manufacturers' agent, specializing in oil-field equipment, died recently in Tulsa.

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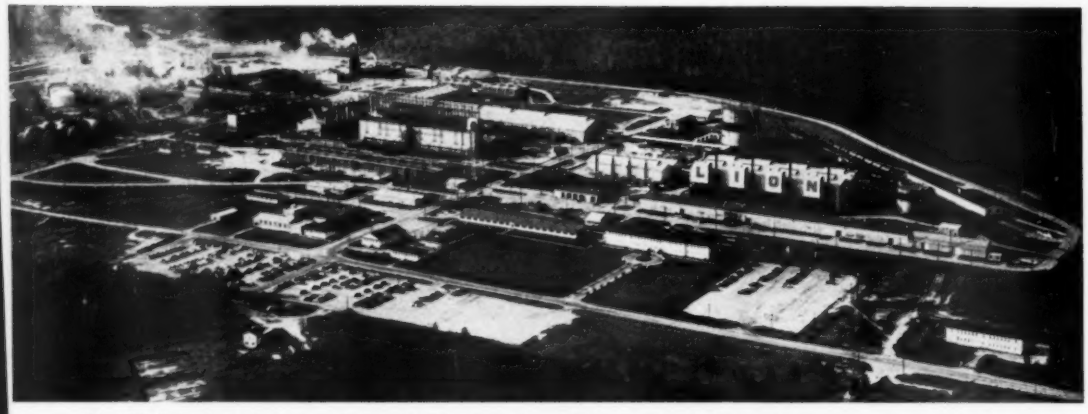
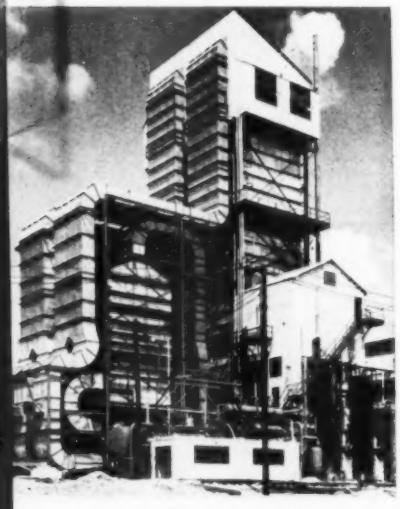


Lion Oil Co.'s chemical plant at El Dorado, Ark. Annual production capacity of this plant represents approximately 10 per cent of the nation's total private synthetic nitrogen production capacity.

Lion Chemical Produces 1,200 Tons Daily Of Petrochemicals From Natural Gas

by F. Lawrence Resen
Gulf Coast District Editor

END products of nitrogen, vital to agriculture and many manufacturing processes, make up the bulk of the 1,200-ton daily output of Lion Oil Co.'s petrochemical plant at El Dorado, Ark. Lion, a long-established refiner and crude-oil producer in the Southwest, is also a member of the booming petrochemical industry with its rapidly growing chemical division.



Pelleting facilities at Lion's El Dorado chemical plant.

Natural gas, air, and water are fed into the El Dorado plant to produce the huge tonnages of nitrogen products. Altogether, the petrochemical plant produces anhydrous ammonia (98 tons daily), three types of nitrogen solutions (376 tons daily), ammonium nitrate fertilizer (380 tons daily), sulfate of ammonia (380 tons daily), aqua ammonia (20 tons daily), and sulfuric acid (12 tons daily). The figures in parentheses are the quantities produced for sale under capacity operation.

Basic product of the Lion plant is anhydrous ammonia, of which 570 tons are produced daily. One-fourth of the daily ammonia production is sold as such, the remainder being used as an intermediate product in subsequent plant operations at El Dorado.

Ammonia Production

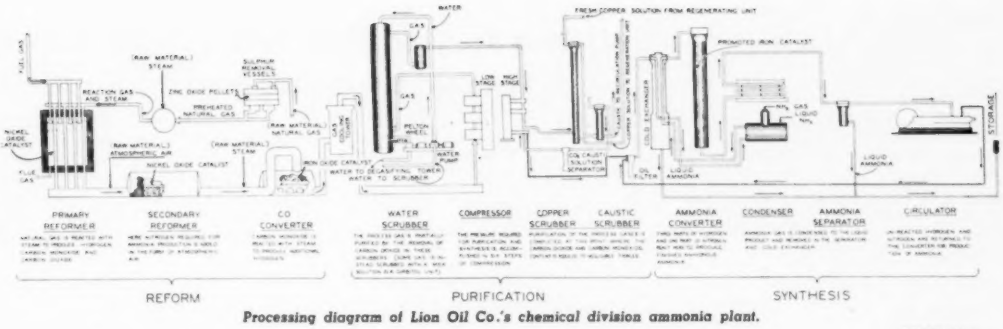
The continuous ammonia manufacturing process involves three principal steps—gas reforming, purification, and synthesis.

Gas reforming.—The gas-reform step prepares the process gas from which anhydrous ammonia (NH_3) is made. Natural gas is passed through sulfur-removal vessels containing zinc oxide pellets and is then reacted with steam in the presence of nickel oxide catalyst. The hydrogen, carbon monoxide (CO), and carbon dioxide (CO_2) travel to the secondary reformer where nitrogen in the form of atmospheric air is added.

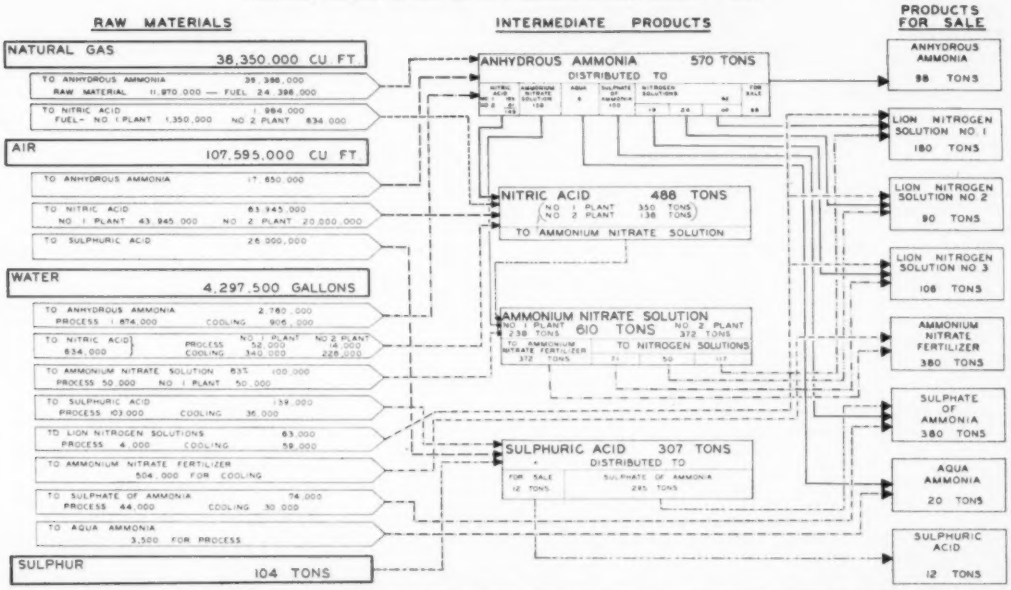
The gas mixture proceeds to the CO converter where carbon monoxide is reacted with steam in the presence of iron oxide catalyst to produce additional hydrogen. The entire mixture of gases then enters a gas-cooling tower before reaching the purification stage. The process gas coming out of the reform step contains the required one-to-three ratio of nitrogen and hydrogen in addition to carbon dioxide and carbon monoxide impurities.

Purification.—The purification process is composed of two principal operations, each of which has definite heat and pressure requirements. The process gas is first compressed to 220 psi. and passed through either a water-scrubbing tower or a Girbotol unit containing MEA (monoethanolamine) solution to remove carbon dioxide. Water from the scrubber is sent to the degasifying tower where the pressure is released and the carbon dioxide vented to the atmosphere. The MEA solution returns to its regenerator.

Another pass through compressor units brings the process gas to scrubbing towers where carbon monoxide is removed by copper liquor—cuprous ammonium formate. A caustic scrub-

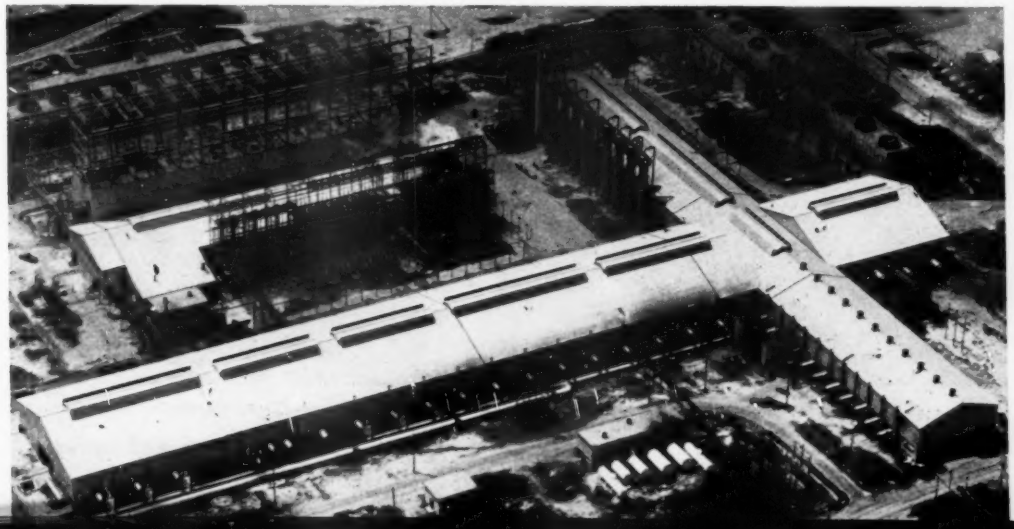


Processing diagram of Lion Oil Co.'s chemical division ammonia plant.


RAW MATERIALS
INTERMEDIATE PRODUCTS
PRODUCTS FOR SALE
NATURAL GAS 38,350,000 CU FT
AIR 107,595,000 CU FT
WATER 4,297,500 GALLONS
SULPHUR 104 TONS
ANHYDROUS AMMONIA 570 TONS
DISTRIBUTED TO
NITRIC ACID 488 TONS
NO 1 PLANT 350 TONS
NO 2 PLANT 138 TONS
TO AMMONIUM NITRATE SOLUTION
AMMONIUM NITRATE SOLUTION
NO 1 PLANT 610 TONS NO 2 PLANT 372 TONS
SULPHURIC ACID 307 TONS
DISTRIBUTED TO
ANHYDROUS AMMONIA 98 TONS
LION NITROGEN SOLUTION NO 1 180 TONS
LION NITROGEN SOLUTION NO 2 90 TONS
LION NITROGEN SOLUTION NO 3 108 TONS
AMMONIUM NITRATE FERTILIZER 380 TONS
SULPHATE OF AMMONIA 380 TONS
AQUA AMMONIA 20 TONS
SULPHURIC ACID 12 TONS

Material balance on Lion's chemical-plant operation. Quantities are based on capacity production of ammonia without allowance for seasonal variations and down time.

Aerial view of the huge gas-engine building at Lion's El Dorado plant. Area of the building's main floor and basement is equal to more than five football fields.



ber removes any remaining carbon dioxide before the gas is compressed to 5,000 psi. prior to synthesis. A regenerating unit is provided for the copper liquor while the spent caustic is discarded.

Synthesis.—The final synthesis step occurs at a temperature of 977° F. where the hydrogen and nitrogen are united in the presence of a promoted iron catalyst. Since only a portion of the gas is reacted during its initial pass through the catalyst bed, the unreacted gas must be recirculated through a synthesis loop system. A material balance is maintained in the loop between the liquid ammonia being withdrawn and the incoming gases. The ammonia product is piped to storage spheres, tank cars, or other sections of the plant for further processing.

Diversified Production

The ending of the ammonia process at Lion's El Dorado plant is actually but the beginning of several other processes. The ammonia is used in the production of several nitrogen-containing end products destined for agriculture and industry.

Nitric acid.—Nitric acid (HNO_3) is produced as an intermediate product and a portion of the ammonia production is diverted to two nitric plants with a combined capacity of 500 tons. Although these plants differ slightly in design, size, and operating conditions, the processes are essentially the same and are described below.

Ammonia in the presence of air is passed over a platinum-gauze catalyst at high temperatures where it is oxidized or burned. It is in this step where the highest operating temperature—1,652° F.—in the plant is reached. After a secondary-oxidation step the nitrogen oxides which have been formed are absorbed in water to produce nitric acid of approximately 57 per cent strength. The acid is neutralized with ammonia to form ammonium nitrate (NH_4NO_3) solution of a approximately 83 per cent strength.

Nitrogen solutions.—Part of the ammonium nitrate is fortified with addi-

Chemical Reactions Which Occur as Natural Gas Is Processed Into Various End Products

These chemical reactions occur within Lion's petrochemical plant as the natural gas is processed into the various end products.

Gas Reforming Stage

Input: Natural gas plus steam.

Output: Process gas, including nitrogen and hydrogen plus carbon dioxide and carbon monoxide impurities.

Primary reformer — (catalyst—metallic nickel in active state)

$$CH_4 + H_2O = CO + 3\,H_2$$

$$CO + H_2O = CO_2 + H_2$$

Secondary reformer—(catalyst—metallic nickel in active state)

$$CH_4 + H_2O = CO + 3\,H_2$$

$$\text{Air } (N_2 + O_2) + 2\,H_2 = N_2 + 2\,H_2O$$

CO converter—(catalyst—iron oxide)

$$CO + H_2O = CO_2 + H_2$$

Purification Stage

Input: Process gas from gas-reform step.

Output: Process gas purged of impurities.

Water scrubbing—

$$CO_2 + H_2O = H_2CO_3$$

MEA scrubbing—

$$2\,HOCH_2CH_2NH_2 + CO_2 + H_2O = (HOCH_2CH_2NH_3)_2CO_3$$

Copper liquor scrubbing—

CO absorption

$$Cu(NH_3)_2COOH + CO = Cu(NH_3)_2COOH{\cdot}CO$$

CO_2 absorption

$$2\,NH_3 + H_2O + CO_2 = (NH_4)_2CO_3$$

Caustic scrubbing—

$$2\,NaOH + CO_2 = Na_2CO_3 + H_2O$$

Synthesis Stage

Input: Hydrogen and nitrogen under pressure and in a 3:1 ratio.

Output: Liquid ammonia.

(Iron oxide catalyst of magnetic form promoted with potassium and aluminum oxides. To become active the iron must be reduced to metallic form.)

$$3\,H_2 + N_2 = 2\,NH_3$$

Nitric Acid Plant

Input: Ammonia, oxygen (air), water.

Output: Nitric acid (57 per cent).

Ammonia oxidation—(catalyst—platinum-rhodium gauze)

$$4\,NH_3 + 5\,O_2 = 4\,NO + 6\,H_2O$$

Secondary oxidation—

$$2\,NO + O_2 = 2\,NO_2$$

Absorption—

$$3\,NO_2 + H_2O = 2\,HNO_3 + NO$$

Ammonium Nitrate Neutralization

Input: Nitric acid plus ammonia.

Output: Ammonium nitrate (83 per cent).

$$HNO_3 + NH_3 = NH_4NO_3$$

Sulfuric Acid

Input: Sulfur plus oxygen (air).

Output: Sulfuric acid.

Sulfur burning—

$$S + O_2 = SO_2$$

Oxidation—(catalyst—vanadium pentoxide)

$$2\,SO_2 + O_2 = 2\,SO_3$$

Absorption—

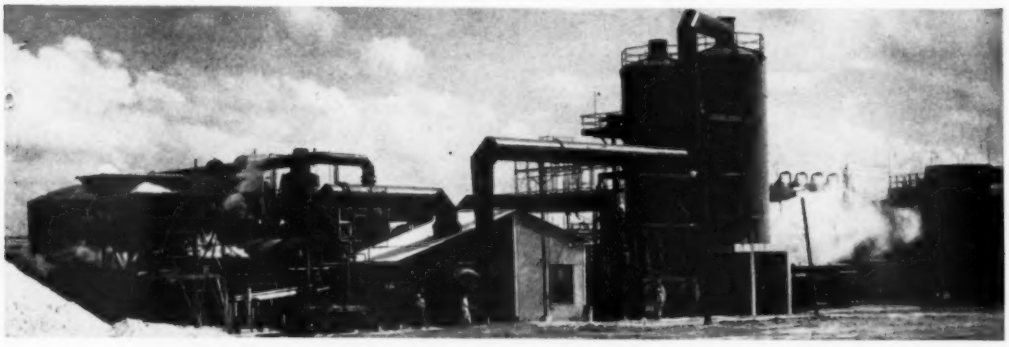
$$SO_3 + H_2O = H_2SO_4$$

Sulfate of Ammonia

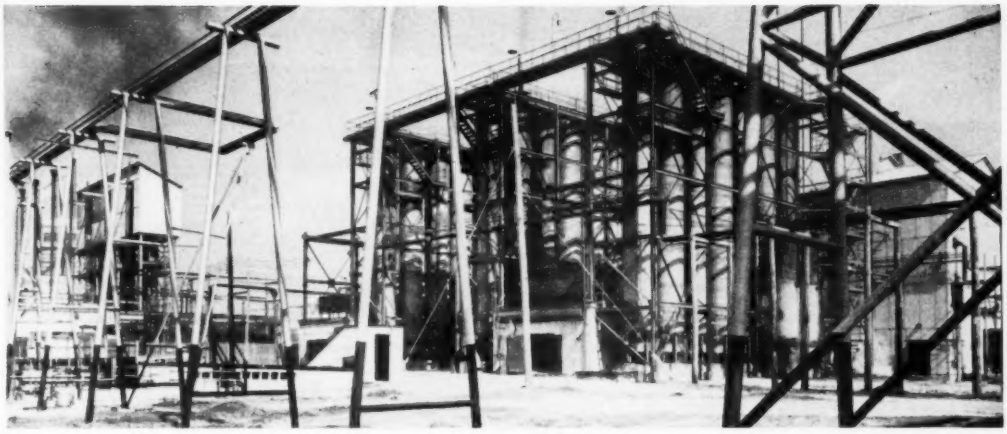
Input: Sulfuric acid plus ammonia.

Output: Sulfate of ammonia.

$$H_2SO_4 + 2\,NH_3 = (NH_4)_2SO_4$$



The contact sulfuric acid plant, a part of Lion's chemical operations near El Dorado, Ark.



View of a part of the two nitric acid plants operated by Lion Oil Co. in the manufacture of nitrogenous fertilizer materials.

tional quantities of ammonia to make nitrogen solutions. These are sold by Lion to fertilizer manufacturers as a nitrogen source in the making of mixed fertilizers. The solutions are transferred to aluminum storage tanks holding the equivalent of five railway tank cars. These tanks are said to be the largest pressure vessels ever fabricated entirely from aluminum.

Ammonium nitrate.—Some of the 83 per cent ammonium nitrate solution is concentrated under vacuum to approximately 96 per cent. This liquor is sprayed through specially designed nozzles at the top of the "shot towers" to fall against an updraft of conditioned air. As it falls, the ammonium nitrate is solidified in the form of spherical pellets which pass through a series of dryers and coolers and are finally coated with a thin layer of conditioning clay. The product is finished ammonium nitrate fertilizer having a guaranteed minimum nitrogen content of 33.5 per cent.

Sulfuric acid.—One of the newest installations at El Dorado is the sulfuric acid (H_2SO_4) plant which requires the bringing in of raw sulfur. Sulfur in the presence of dry air is burned to sulfur dioxide (SO_2) which is oxidized in the presence of a catalyst to sulfur trioxide (SO_3). The trioxide is passed through an absorption tower to produce sulfuric acid. Strong sulfuric acid is circulated through the tower to facilitate the absorption of the sulfur trioxide.

Under capacity conditions this plant will utilize 100 tons of sulfur per day to produce 300 tons of 98 per cent sulfuric acid.

Sulfate of ammonia.—The sulfuric acid is neutralized with ammonia to produce sulfate of ammonia—$(NH_4)_2SO_4$. This material is dried, coated with a conditioning clay, and transferred to storage or packaging. Sulfate of ammonia is a fertilizer material used both for direct application and for making high-analysis mixed fertilizers. Capacity is approximately 380 tons daily.

Plant Utilities

The natural gas is not only a raw material for Lion's plant, but also one source of the heat and power which are necessary to the processing of the gas. A total of nearly 40 million cubic feet of gas is consumed during daily operations.

Gas engines.—The gas-engine building contains 62 large gas-driven engines ranging from 1,000 to 1,440 hp. The total 68,240-hp. output of these engines is believed to be the largest concentration of gas-driven horsepower under one roof in the world.

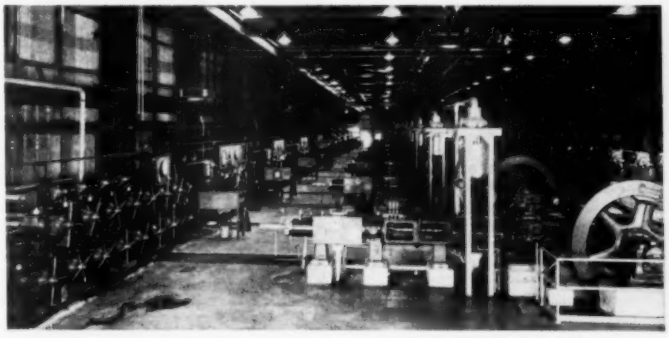
To house the massive array of engines, the gas-engine building has a total floor area of nearly ¼ million square feet. That's enough acreage to play five football games at once.

Electrical.—Electrical power is obtained from three sources—11 generators are driven by gas engines, 2 generators are driven by steam turbines, and there are 4 water-wheel driven generators in the water scrubber. Total output of these generators would be sufficient to supply the domestic needs of a city with a population of 250,000.

Water.—Eleven deep-water wells have been drilled to provide a water replenishment source. With the reconditioning and recirculating facilities in operation, only a small percentage of the 133 million gallons daily circulation has to be replaced.

History and Growth of Operation

In May 1943 the plant went into operation producing anhydrous ammonia for wartime purposes. At that time it was operated by a wholly owned subsidiary of Lion. In May 1946 Lion leased the plant for private operation and purchased it outright 2 years later. In recent years the company has invested more than $10,000,000 in improvements and modifications to increase capacities and diversify production. One thousand employes are actively engaged in operating Lion's El Dorado plant, another strong link in the rapidly expanding petrochemical industry.



Over-all view of the equipment layout in Lion's synthesis building at El Dorado, Ark.

The gas-compressor and gas-cycling plant now serving the Newhall-Potrero field will be expanded soon to include the Fifth zone reservoir.

PROGRESS REPORT:

California's Prolific Potrero Oil Field

During the past 4 years, 30 oil wells have been completed in the prolific Fifth zone at a depth of more than 8,000 ft. in this southern California oil field. Sunray Oil Corp. has recovered more than 2,920,836 bbl. to date and is producing 3,406 bbl. daily from this zone. Gas-injection wells are being drilled for purpose of including this deeper reservoir in the pressure-maintenance program.

by Oran A. Greybeal*

AFTER 4 years of intensive development, the Fifth zone in Newall-Potrero oil field has 30 oil wells on production, producing 3,406 bbl. daily. This marks one of the most significant phases of the development of this 13-year old field. Six more wells will be drilled to complete the development program of this reservoir.

Plans are now under way to drill two more injection wells and to enlarge the capacity of the field compressor plant to include the Fifth zone in the pressure-maintenance program long in effect in the field. Gas injection into this formation should enable producing the reservoir at a higher rate and to obtain a higher percentage recovery of the original oil in place.

Newhall-Potrero oil field is located about 40 miles north of Los Angeles in the northern foothills of the Santa Susana Mountains. It was discovered in 1937 by Barnsdall Oil Co. (now Sunray Oil Corp.) with the completion of 1 Rancho San Francisco as a producer in the First zone.

The structure is a highly folded anticline with a total productive area of about 600 acres. Productive limits of the field appear to be defined by low permeability and resulting low productivity around the outer edges of the field, rather than by a true water table. Water does not present either a reservoir or operating problem.

The anticline is asymmetrical. Dips on the north flank range from 25° to 50°, averaging 40°. The south flank exhibits even steeper dips, ranging from 40° up to 90° and averaging 70°. The easterly end of the south flank

*Reservoir engineer, Sunray Oil Corp., Los Angeles.

This view illustrates the rugged terrain of Newhall-Potrero field in Santa Susana Mountains. Topography poses a problem in preparation of rig locations in this field.

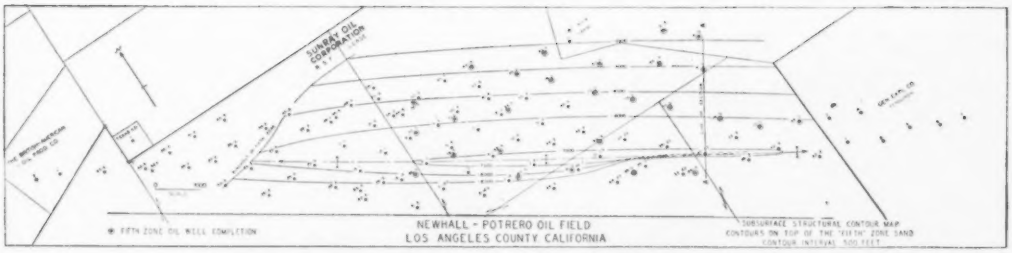
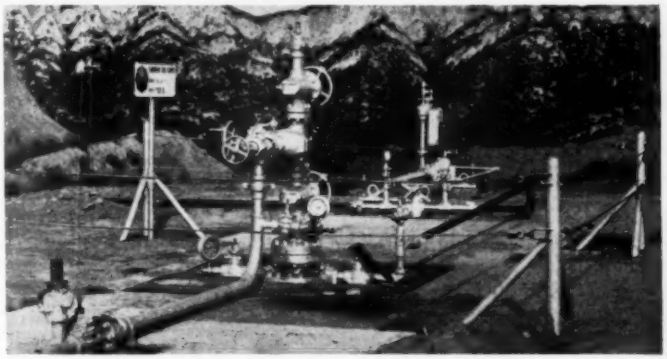


Fig. 2—Subsurface structural contour map, contoured on top of the "Fifth zone" sand.

in the vicinity of 89 R.S.F. appears actually to have been overturned. The accompanying cross-section, shown as Fig. 1, which has been prepared along a northeast-southwest line of section, transverse to the major axis, illustrates the extreme dips encountered on the south flank.

Upper zones.—Development operations in the early years were confined to the upper three productive zones which have produced a total of 17,650,000 bbl. of oil. Currently, these zones are producing 3,450 bbl. of oil per day under a gas-injection pressure-maintenance program which was initiated in 1945.

Pre-Third zone work.—Prior to 1944 no well had explored below the Third zone. In December of that year, the first deep well, 44 R.S.F., penetrated an interval known as the Fifth zone found from 1,000 to 1,500 ft. below the Third zone. The well was drilled to the Ninth zone but was plugged back and completed early in 1945 as the discovery well on the Sixth zone.



A typical christmas tree hookup, 52 R.S.F., in Newhall-Potrero field.

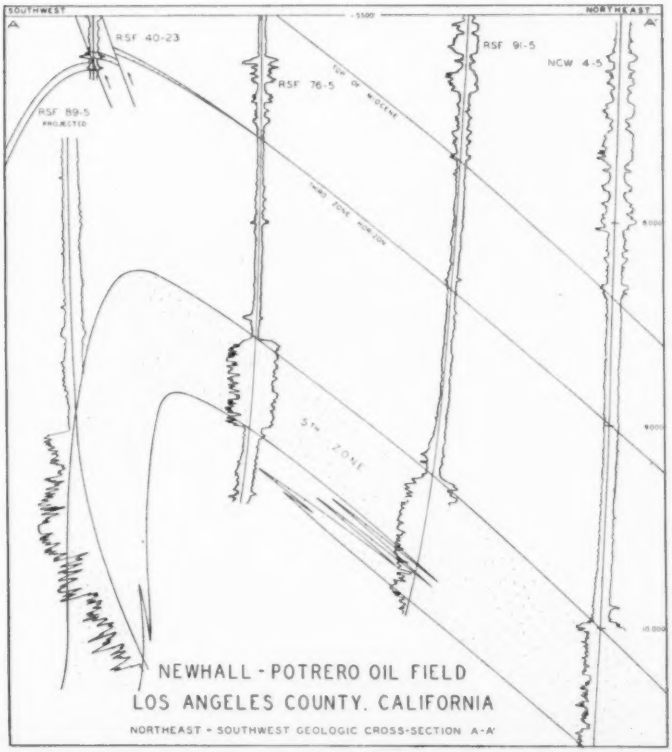


Fig. 1—Northwest-southeast geologic cross-section A-A' of Newhall-Potrero oil field.

Fifth zone discovery.—Although the Fifth zone was never actually tested in 44 R.S.F., it had been logged as oil sand and appeared as though it should be a productive horizon. Shortly thereafter, 53 R.S.F. was spudded in to test this Fifth-zone interval; it was completed on June 20, 1946, flowing 336 bbl. per day through perforations from 8,680 to 8,890 ft. This marked the first commercial completion in the Fifth zone reservoir.

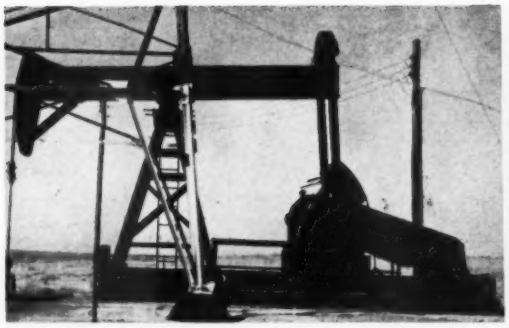
Deeper reservoirs.—Since the completion of 44 R.S.F., three additional wells have been completed in the Sixth zone, one in the Seventh zone, and one in the Ninth zone. However, these zones have been developed only partially to date. By far, the greatest portion of the deep-zone development has been made in the Fifth zone where 26 commercial oil-well completions have been recorded.

Fifth Zone Reservoir

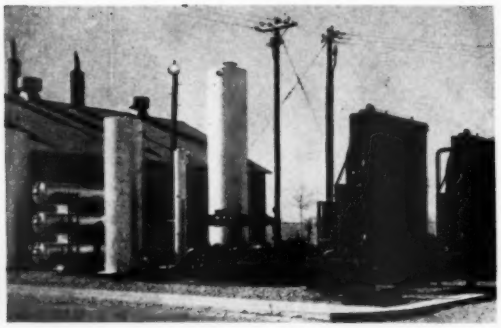
The Fifth zone appears to operate under a solution gas drive. Water does not appear to present either a reservoir or an operating problem. No free gas cap existed in the reservoir.

Due to the tremendous, structural closure, which exceeds 2,000 ft., the characteristics of the produced oil have varied widely from crest to

(Continued on page 96)



Typical well-pumping installation in Cedar Lake field. The three-phase 480-volt service line is shown in background.



This view of generating plant, near the shore-line of Cedar Lake, shows terminal poles for two-circuit system.

Stanolind Electrifies Cedar Lake Field

Operations in this West Texas field where 43 wells have been electrified, show pumping power costs average $0.0108 per barrel

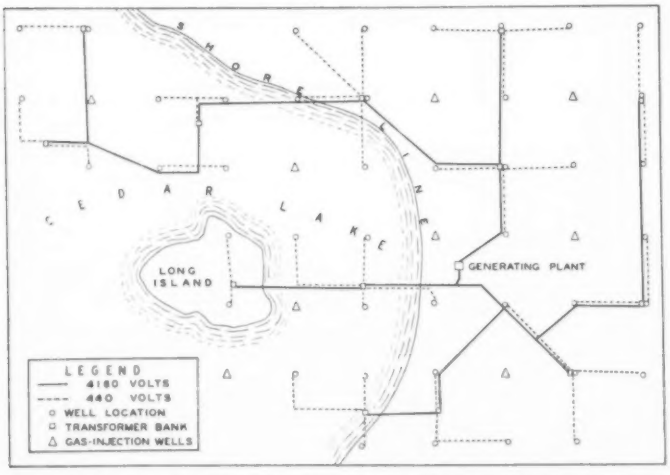
by Roy F. Carlson
West Texas District Editor

AN extremely corrosive fuel-gas supply and an absence of a public electric-power supply were responsible for Stanolind Oil & Gas Co. building a generating station and a distribution system for supplying power to electrically pump 43 producing wells in Cedar Lake field. Sour fuel gas corroded gas engines severely, and the presence of these hydrogen sulfide fumes in the air around the engines was enough to cause failure of cooling-water radiators.

Although power is now available in the field from a public utility, and would probably be used if the generating plant were not already in existence, Stanolind prefers to continue to generate its own power. The 43 wells are furnished electricity by two gas-engine-driven generators, with a third engine -generator unit as a standby. Power is generated and transmitted to transformer banks at 4,160 volts over a three-phase system. At the transformer banks, located as centrally as possible in groups of three or four wells, voltage is stepped down for use by the 440-volt motors on the pumping units.

All pumping-unit motors are three-phase, 15-hp., 60-cycle, 440-volt, 1,750-r.p.m. machines, and are belted to large pumping units. The units lift oil from a pay horizon at from 4,775 to 4,825 ft. below the surface, and lift, from 43 wells, about 2,500 bbl. of oil per day. Oil is about 32° gravity, on the A.P.I. scale. Some of these wells are making small volumes of water and six of them are marginal producers. Production is carried in 2½ or 3-in. lines to tank batteries.

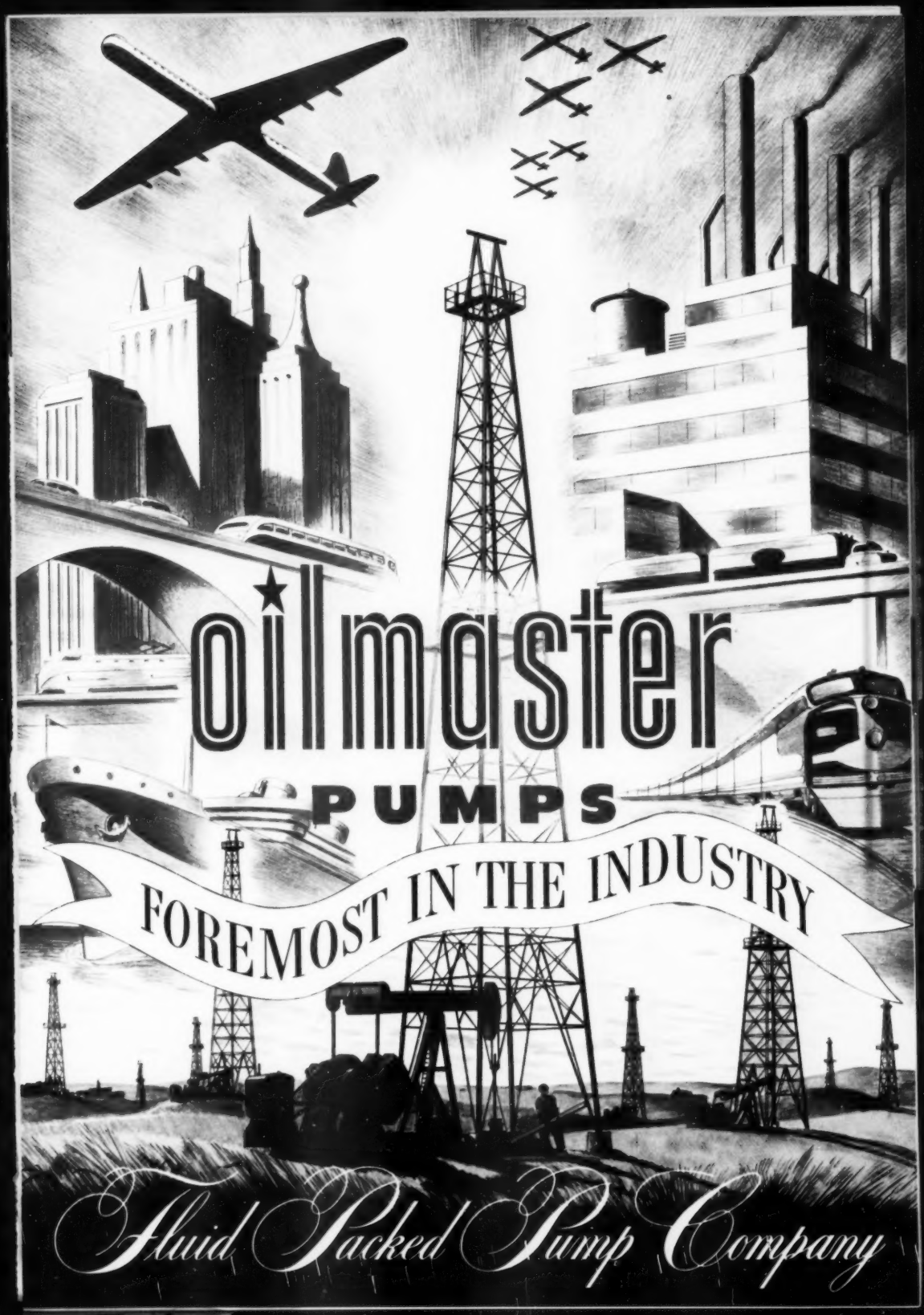
The individual units are overpowered on a horsepower basis, since at least a one-third smaller motor would lift the oil into storage tanks. But since the produced oil tends to deposit paraffin in flow lines and increase the head against which the pumps have to work, the larger motors are used. The paraffin trouble was also responsible for installation of the relatively large-diameter flow lines.



Layout of the two-circuit electrical transmission system in Cedar Lake field, Gaines County, Texas. Cedar Lake is not a lake in the ordinary sense. It is a deposit of alkali, left by evaporation of a body of water.

Generation and Supply System

The electrification system is divided into two separate transmission circuits, each of which includes about one-half of the wells. The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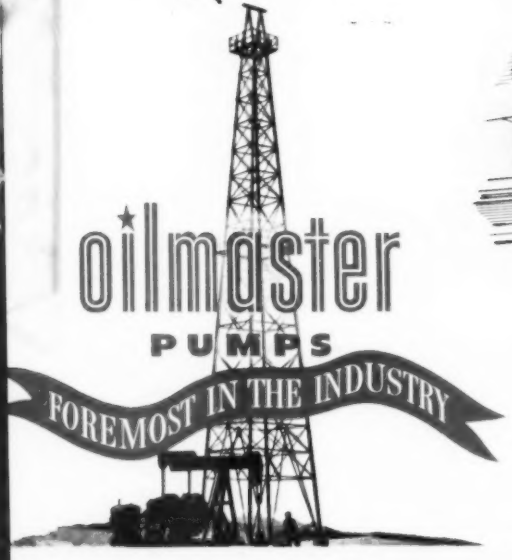

Main Office and Plant, Los Nietos, Calif.

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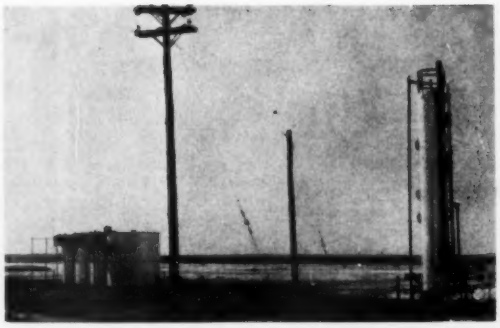
Fluid Packed Pump Company

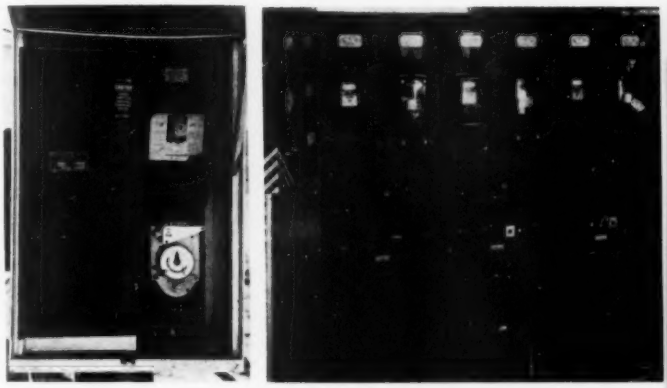
This view of a portion of Cedar Lake shows some of the production equipment located on the alkali lake bed. Because of spongy bearing, islands were constructed for supporting equipment.



One of the "landward" tank batteries of Cedar Lake field. Circulation pumps for this and other installations are to be electrified and equipped with automatic shutoff timing switches.

transmission line is preponderantly of No. 6 hard-drawn bare copper wire, with about 33,000 ft. each of No. 2 and No. 4. The total footage of this transmission wire is 241,391 ft. About 12,000 ft. of weatherproof wire is used around the various pumping installations. Supporting poles used were primarily of the 35-ft. length although other lengths between 30 and 45 ft. were used. A total of 267 poles were used with the transmission system, with 6 short stub poles also used. (The design of secondary lines was hampered somewhat by irregular spacings of the pumping wells, which resulted after several wells were converted for gas-injection purposes.)

The power-generation station has, as previously mentioned, three units, each rated at 172 kw. at a power factor of 0.8. Generators are of the open type, have a rated speed of 400 r.p.m., and have a temperature rise rating of 50° F. Each of the generators is powered by a direct (connected) four-stroke-cycle, V-type, six-cylinder, 11 by 13½-in. gas engine which is rated at 250 b.hp. at the plant site.

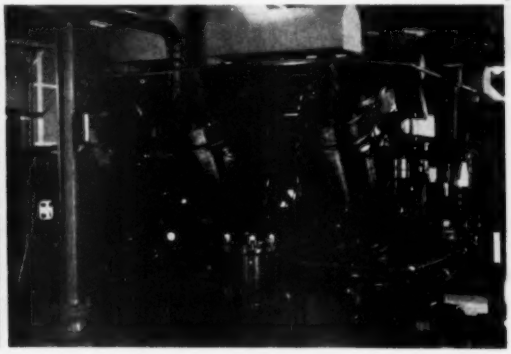


Left: View of motor controller with cover raised. This unit automatically starts and stops motor operation at predetermined intervals. Right: Recorder-controller panel for electrical-generation equipment at Cedar Lake.

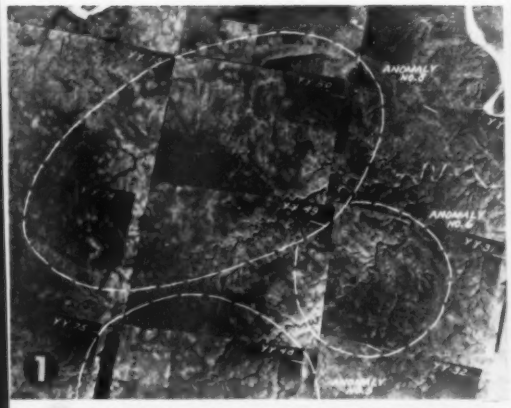
Each motor installation includes a control unit provided with an automatic time switch for starting and stopping the motor at predetermined times, an undervoltage relay, overload relays, and lightning arresters, for properly protecting the equipment from damage due to overload or lightning. Some trouble has been

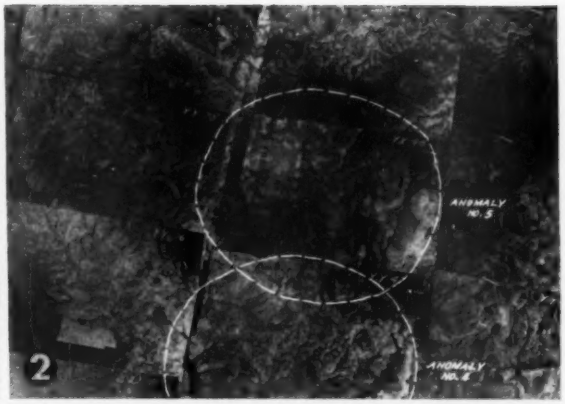
(Continued on page 104)

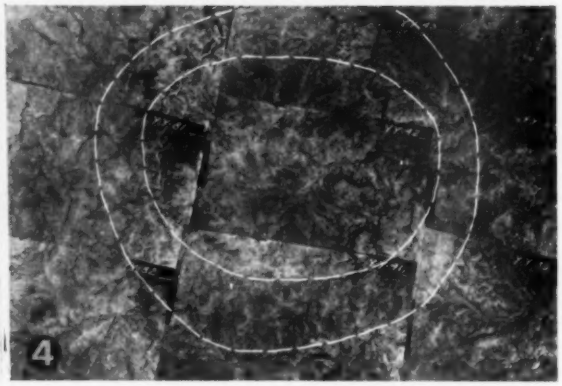
Electrical power for operating 43 wells is supplied by this generating equipment. Two of the three units shown in this view of the power plant are in operation at any given time, while the third is on standby service.



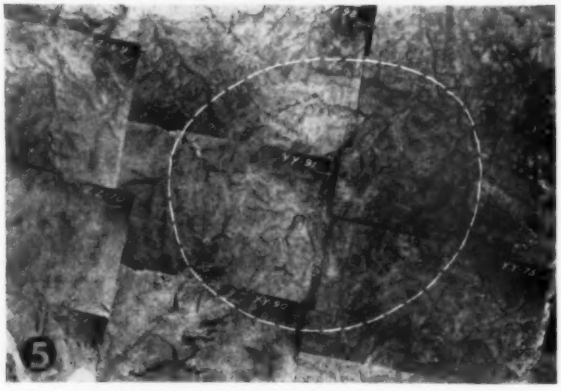
One of three V-type gas engines for driving generators at Stanolind's Cedar Lake project. Sweet gas for fueling the engines is supplied via a long pipe line which also supplies gas for injection operations in the field.







Figs. 1-5—Various types of photogeologic anomalies referred to in text.



Photogeologic Study in Kent County, Texas*

Here is a report of a photogeologic study prepared prior to exploratory drilling activity

PART 1—By Charles De Blieux

*Paper delivered at the 1951 annual meeting, American Association of Petroleum Geologists, St. Louis, April 26. Published with illustrative photography used with permission of Muldrow Aerial Surveys, Midland, Tex.

FROM a broad photogeologic view, there is close geologic and geographic similarity between the Gulf Coast and West Central Texas. Structurally, both are regional basins, one of such size and deformity as to be termed a geosyncline — a difference of degree only. Geomorphically, both are depositional plains, one of such altitude and relief as to be called "high plains." Both surfaces are composed of poorly differentiated strata and over most of the two areas there is cover of younger sedimentary mantle, one of more recent age and of greater thickness, but, again, a matter of degree. It is logical, therefore, to find that the Gulf Coast and West Central

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TD-14A DOZING a reserve pit at Midway Lake.

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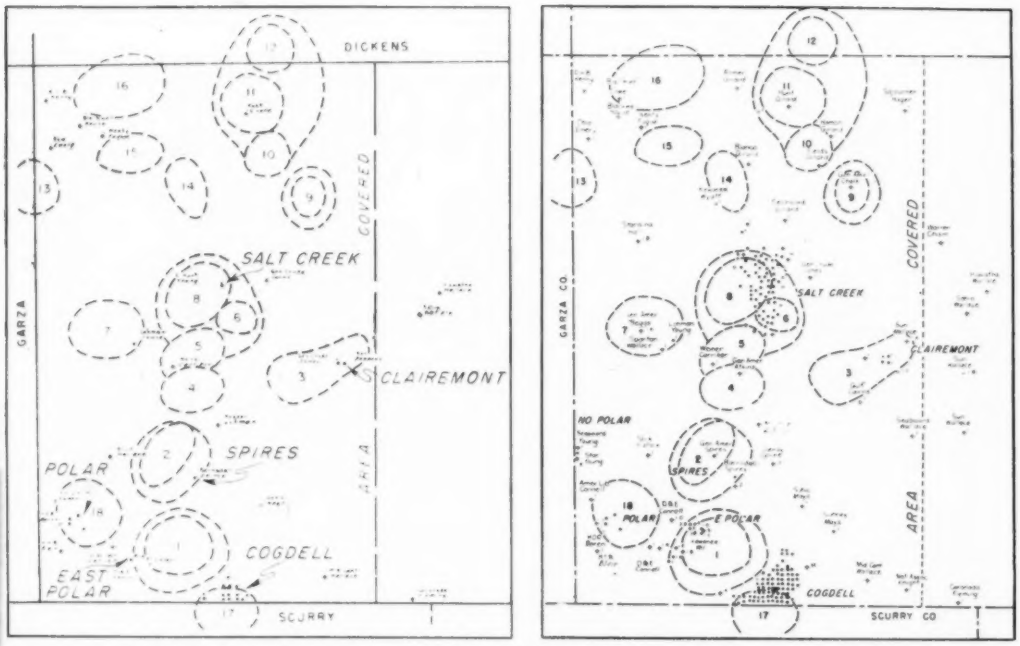

Figs. 6-7—Kent County development maps. As of May 14, 1950 (at left) and as of April 1, 1951. (See Part 2.)

Texas share basic photogeologic evidences of structure.

One of the most apparent differences between the two basins is that subsidence and local structural growth in the geosyncline are presently continuing and it is generally believed that the Permian basin has been relatively quiescent for some geologic time. In photogeologic study this is important only in age relationship between time of structural generation or regeneration and deposition of the sedimentary mantle.

In both basins, it is patent that the youngest sediments involved in basin formation—Tertiary in the Gulf Coast and Permian in West Texas—will reflect local structure. It follows that, since structural movement is still in progress in the Gulf Coast, those sediments constituting the Pleistocene and Recent cover should and do bear surface expression of local structural growth.

From deep structures. — Further, there is definite evidence in the West Texas basin that the shallow structural reflections found in Permian beds persist through the Triassic, Cretaceous, and Tertiary mantle and are expressed on the surface. This postulates local structural growth in Tertiary time.

The recent work of G. H. Brodie and others of the Abilene Geological Society's structure-study group has demonstrated that there exists close relationship between deep and shallow structure in West Central Texas as reflected in near-surface Permian horizons. This society's symposium (Structure Study Group Symposium, 1949) proposes and supports a structure-forming role for limestone reefs and similar less-compactible lithologic units which is effective in shallow superreef beds.

The work of the group has definitely established that mappable deformation is expressed through great thicknesses of sediments. Diminishing and dampening of structural relief by younger sediments is, of course, inevitable and is often effective in upward reduction of appreciable closure to a structural nose or terrace. But it is significant that the nose or terrace does exist at shallow horizons and is discernible at the surface.

Structural genesis is not important in this type of photogeologic study. Whether local structure is a result of upward movement, differential downwarping, reef or residual topography, or a combination of these, the surface evidences are identical. The photogeologic expression of a reef anomaly bears no peculiar characteristic that distinguishes it from an Ellenburger structure.

However, these surface evidences, though they may not be genetically definitive, effect such departure from the normal that they may be recognized with reliability as structurally anomalous.

Photogeologic Criteria

In the absence of consistent and traceable lithologic units on the sur-

(Continued on page 98)

THE AUTHORS

C. De BLIEUX

G. F. SHEPHERD

Charles De Blieux, consulting geologist, graduated from Louisiana State University with an M.S. degree and worked as a subsurface geologist in South America and the Gulf Coast during the years prior to the war. He received his early photogeologic experience in World War II. Since 1945 he has been engaged exclusively in photogeologic studies and in 1948 opened consulting offices in New Orleans.

G. Frederick Shepherd has been chief geologist, General American Oil Co. of Texas, Dallas, since 1948. He graduated from Hamilton College, Clinton, N. Y., in geology, did post graduate geological work at Northwestern University, and at University of Chicago. He was geologist with Phillips Petroleum Co., 1936-1940, and geologist with Lane-Wells Co., Houston, 1940-1941. Shepherd was then geologist with William Helis at New Orleans, 1941-1946, and consulting geologist at New Orleans, 1946-1948.

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Oxygen Measurement

as a guide to

Combustion Efficiency

by L. D. Cipriano* and O. W. Riggs†

"HOW can our refinery fuel bill be reduced?" This question has been asked by an increasing number of refiners. In practice, good combustion requires the use of excess air, but too much excess air can result in waste of heat. To keep down fuel costs, the amount of excess air must be held at some minimum by which complete combustion is obtained without increase in total heat loss. However, accurate and continuous measurement of excess air during operation is required before a fuel saving program can be made effective. Where there are fluctuations in the relative proportions of different fuels, as when a combination dry gas-fuel oil firing system is employed, carbon dioxide in flue gas is not too good an indication of excess air. A preferable method is measurement of oxygen.

As one example of savings that can be made, a number of oxygen analyzer-recorders were installed at the Trenton, Mich., refinery of Socony-Vacuum Oil Co., Inc., and through a campaign for greater combustion efficiency savings of up to 20 per cent were realized in the annual fuel bill. The oxygen analyzer is also useful for measurement of flue gases from catalytic cracker regenerators. In this case, too little oxygen may result in insufficient burning of carbon, while too much oxygen may lead to secondary burning of carbon monoxide and cause serious damage to the regenerator.

COMBUSTION for boilers, process heaters, and other refinery equipment is a vital factor in refinery operation, due to the enormous amount of fuel consumed and the end effect of its combustion on production efficiency and maintenance. Any fuel of a fixed hydrogen-carbon ratio has a definite theoretical air requirement for complete combustion. The actual air requirement is somewhat in excess of the theoretical to insure intimate mixing of fuel and air and complete combustion. Once the practical value of air flow has been determined it should be accurately maintained. Deviation from the correct amount can affect operations in several ways.

Air requirements.—A deficiency of air will result in loss of unburned fuel out the stack. It may also create excessive furnace temperatures with resulting high furnace-maintenance costs. Greater heat absorption will occur in the radiant section of the system and less in the convection section. In a boiler with a convection-type superheater low steam temperature can result.

Any air in excess of that required for combustion must be heated to the temperature of the other gases in the furnace. Furnace temperatures, therefore, are lower with increased air flow and constant fuel input. Excess air increases the total volume of the furnace gases and increases the gas velocity through the system. The total heat absorbed in the system, for a given fuel input, will be reduced because of lower furnace temperatures and the reduction in the length of time the gas remains in contact with the heat-absorbing surfaces. Higher flue-gas temperature is a direct indication of this loss.

Heat loss and excess air.—Curves in Fig. 1 show the relationship between total heat loss, excess air, and flue-gas temperature. It is evident from these curves that a reduction in either the quantity of excess air or the flue gas temperature or both will reduce the heat loss. Since a reduction in excess air will cause lower flue-gas temperatures, very substantial savings in fuel can be obtained by holding the percentage of excess air to a practical minimum.

For example, if we were burning

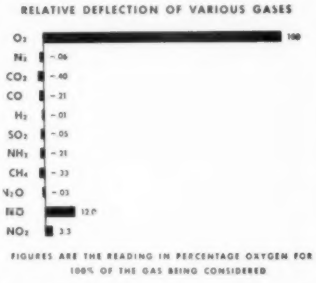


Fig. 3—Illustrating paramagnetic properties of oxygen.

*Process instrumentation engineer, and †manager of application engineering, Hays Corp.

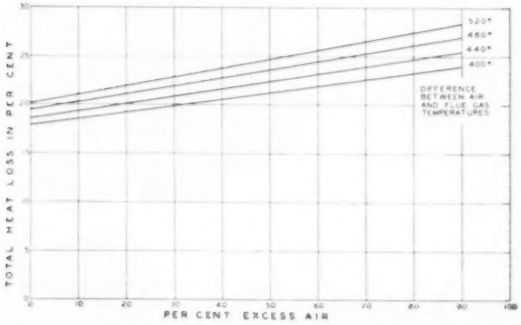


Fig. 1—Relation of total heat loss, per cent excess air and flue-gas temperature.

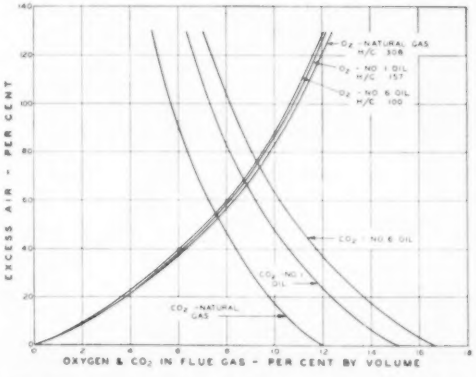

EXCESS AIR - PER CENT
OXYGEN & CO₂ IN FLUE GAS - PER CENT BY VOLUME
O₂ - NATURAL GAS H/C 30.8
O₂ - NO. 1 OIL H/C 15.7
O₂ - NO. 6 OIL H/C 10.0
CO₂ - NO. 6 OIL
CO₂ - NO. 1 OIL
CO₂ - NATURAL GAS

Fig. 2—Oxygen or carbon dioxide in flue gas related to per cent excess air.

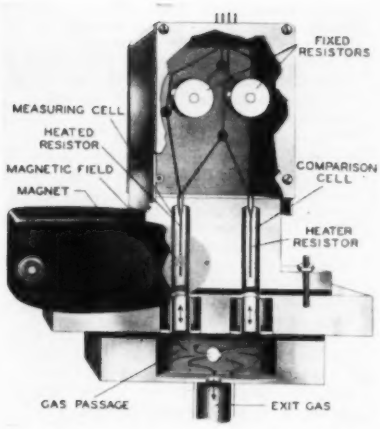


Fig. 4—Schematic drawing of complete cell block, Hays Magno-Therm oxygen analyzer

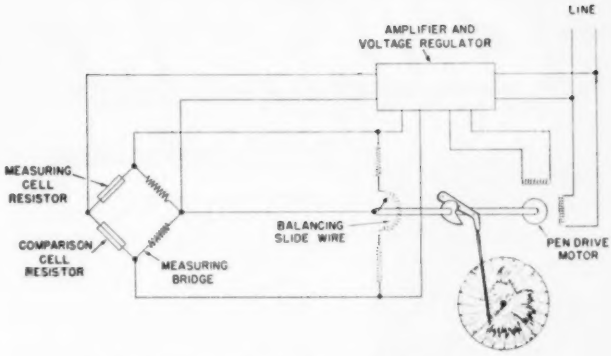


Fig. 5—Measuring and recording circuit of oxygen analyzer.

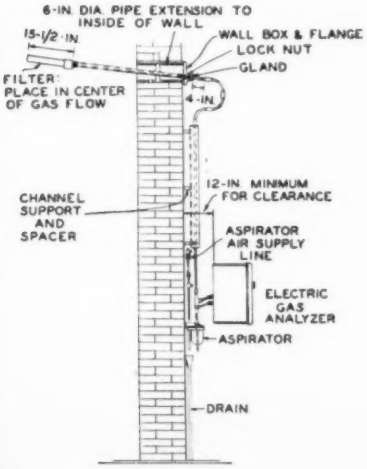
natural gas with 50 per cent excess air with a flue-gas temperature of 590° F. and an air temperature of 70° F. (difference 520°) we would have a total heat loss of 24.75 per cent (from Fig. 1). If we reduced the excess air to 20 per cent and the flue-gas temperature dropped to 510° F. (difference 440°) the total heat loss could decrease to 20 per cent (from Fig. 1). The reduction in heat loss would be 4.75 per cent. The fuel burned at the higher efficiency is 75.25 divided by 80.0 or 94 per cent of that at the lower efficiency. Therefore, the saving in fuel is actually 6.0 per cent. In addition to saving fuel, maintenance of the proper fuel-air ratio enables the operator to obtain maximum product output with his existing equipment by obtaining maximum heat transfer.

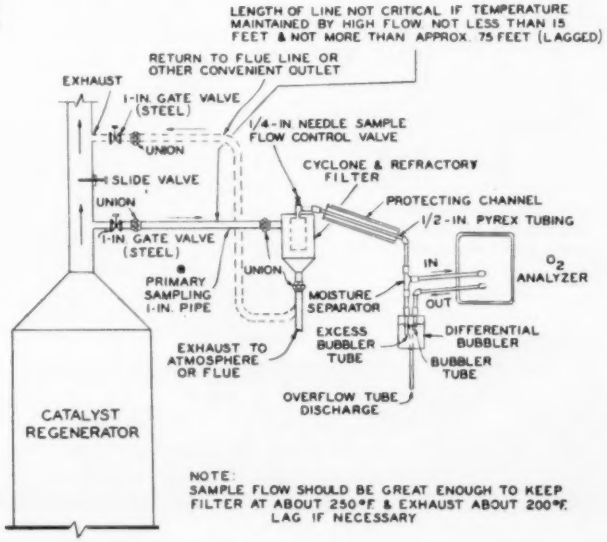
Oxygen in flue gas.—If the proper fuel-air ratio is to be maintained at all times a suitable combustion guide is essential. A direct measurement of the oxygen content of the flue gases provides the most satisfactory check, especially when the hydrogen-carbon ratio of the fuel may be varying.

Fig. 2 shows the relationship between excess air and oxygen or carbon dioxide in flue gas for several different fuels. The relationship between oxygen percentage and excess air varies by only a small amount for all fuels while the CO_2 percentage varies widely with variations in the hydrogen-carbon ratio. It is readily apparent that a shift from firing 100 per cent gas to firing 100 per cent No. 6 oil with 20 per cent excess air will change the CO_2 from approximately 9.8 per cent to 13.75 per cent. Yet the oxygen content varies only about 0.2 per cent for this same change. Once the required amount of excess air is known for the proper burning of any fuel or mixture of fuels the proper fuel-air ratio can readily be maintained using the percentage of oxygen in the flue gases as a guide.

Measuring oxygen.—Several instruments for measuring oxygen have been developed. Among them are those using the paramagnetic properties of O_2 as a basis for measurement. Oxygen is one of the few gases that is paramagnetic. Gases containing oxygen are attracted to a magnetic field and the attraction increases as the oxygen content increases. Fig. 3 shows the effect of passing 100 per cent samples of various gases through an instrument designed to measure oxygen.

Fig. 6 (Below)—Gas-sampling system for a process heater or boiler. Fig. 7 (Right)—Gas-sampling system for regenerator of catalytic cracking unit.




LENGTH OF LINE NOT CRITICAL IF TEMPERATURE MAINTAINED BY HIGH FLOW. NOT LESS THAN 15 FEET & NOT MORE THAN APPROX. 75 FEET (LAGGED)
RETURN TO FLUE LINE OR OTHER CONVENIENT OUTLET
EXHAUST
1-IN. GATE VALVE (STEEL)
1/4-IN NEEDLE SAMPLE FLOW CONTROL VALVE
UNION
SLIDE VALVE
CYCLONE & REFRACTORY FILTER
PROTECTING CHANNEL
1/2-IN. PYREX TUBING
1-IN. GATE VALVE (STEEL)
PRIMARY SAMPLING 1-IN. PIPE
MOISTURE SEPARATOR
IN
OUT
O_2 ANALYZER
EXCESS BUBBLER TUBE
DIFFERENTIAL BUBBLER
BUBBLER TUBE
EXHAUST TO ATMOSPHERE OR FLUE
OVERFLOW TUBE DISCHARGE
CATALYST REGENERATOR
NOTE:
SAMPLE FLOW SHOULD BE GREAT ENOUGH TO KEEP FILTER AT ABOUT 250°F & EXHAUST ABOUT 200°F. LAG IF NECESSARY

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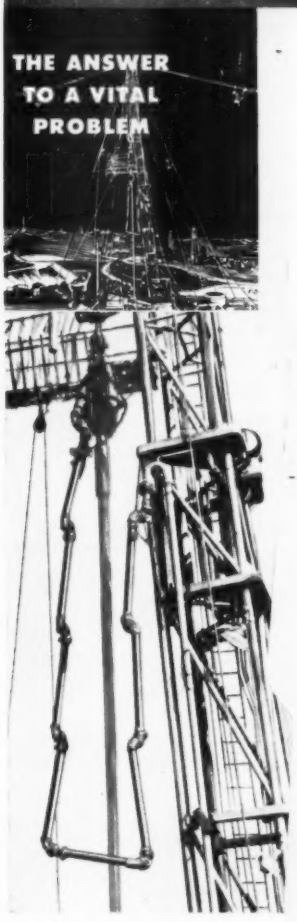

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Some gases other than oxygen have slight diamagnetic and paramagnetic effects but even with a 100 per cent sample of one of these gases the total deflection is small. The effect, if measurable, can usually be calibrated out.

The paramagnetic effect can be measured in several ways. One method is shown in Figs. 4 and 5. Fig. 4 shows the arrangement of the gas passage block and cell block of the Hays oxygen recorder. The two cells are identical except that a strong permanent magnetic field is imposed upon the measuring cell. Each cell contains an accurately wound platinum spiral completely glass encased. These spirals are heated resistors forming two legs of a resistance bridge. The two fixed resistors forming the balance of the bridge are mounted directly above the cells.

Gas entering the instrument flows through the gas passage block and is exhausted to atmosphere. Gas diffuses up into the cells from the gas passage block. Normal heat transfer from the heated resistor occurs in the comparison cell. In the measuring cell, the magnetic field around the end of the spiral attracts the oxygen-bearing gas and draws it into the center of the field. The heated resistor heats the gas; the gas then loses some of its paramagnetic property and warm gas is forced up out of the field by the cooler, more magnetic O_2-bearing gas below. Since the magnetic attraction depends upon the amount of oxygen in the gas, the degree of forced circulation obtained is dependent upon the oxygen content. The forced circulation in the measuring cell produces a greater cooling effect on that spiral, changing its resistance with respect to that of the other spiral. The presence of oxygen, therefore, unbalances the resistance bridge. Measurement of the bridge unbalance is a measurement of oxygen content.

Oxygen analyzer-recorder.—Partial pressure of oxygen is actually measured in this system. To calibrate the instrument in "per cent oxygen" it is necessary to refer to constant base conditions of absolute pressure and temperature. The analyzing section is housed in an insulated cabinet, equipped with a thermostatically controlled heater. Temperature-compensating resistors in the circuit provide further correction for temperature. An automatic pressure compensator measures the absolute pressure of the gas being analyzed and imposes an electrical correction on the measurement to establish a constant pressure base.

The arrangement of the cell, bridge assembly, and bridge balancing potentiometer is shown schematically in Fig. 5. The oxygen recorder consists essentially of two units, the analyzing section and the recording section. These two cases require only electrical connections between them, making it

(Continued on page 100)

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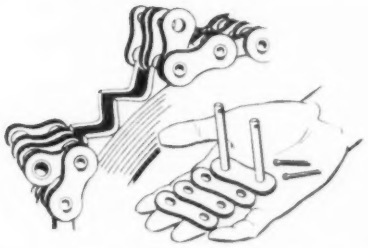
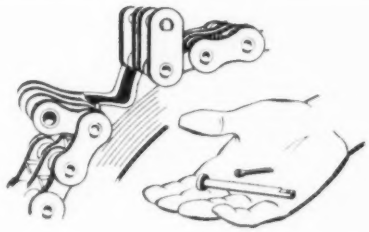


With standard roller chain, in order to take the chain apart in the field, it is necessary to drive out the entire pin link with hammer and punch. The pins are struck alternately, and as the side plates are freed, they must be picked up and set aside to prevent loss or damage. There is always the danger of damage to chain parts as the entire pin link is driven out. Assembly presents additional problems. The two pins must be driven back into the chain while three or more side plates (depending on the number of strands) are held in position. You almost need 3 hands to do the job.



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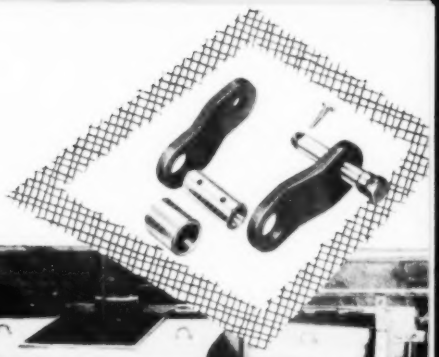

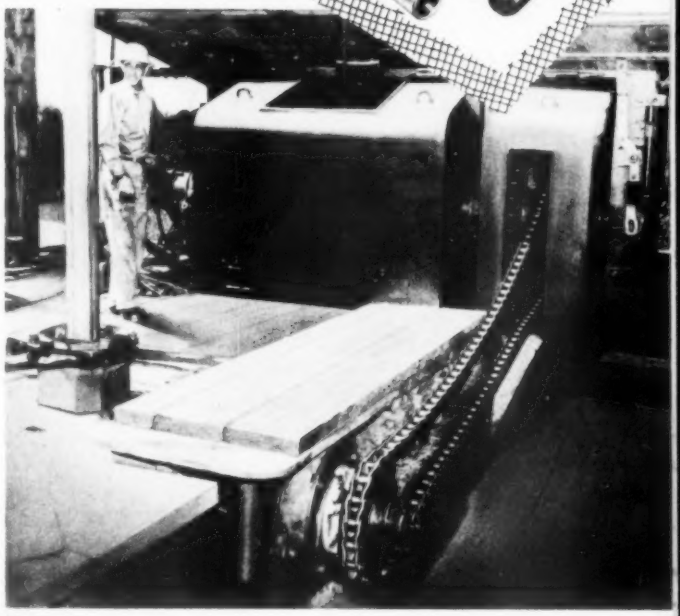

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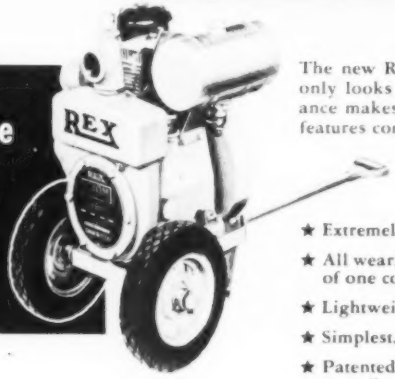

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Helicopters Speed Humble's Exploratory Operations

OVER in the Louisiana marshlands, where even the native muskrat has trouble getting around, Humble Oil & Refining Co.'s exploration crews are using helicopters to solve their transportation problems.

Seismic crews, portable drilling equipment, and gravity-meter instruments are rapidly moved across the boggy marshes at higher speeds and with greater flexibility than are possible using marsh buggies alone. In fact, the 'copter has almost replaced the marsh buggy so far as the gravity-meter crews are concerned.

Seismic uses. — The helicopter is used to best advantage as an adjunct to the marsh buggy in rapidly transporting seismic crews from their base camp or quarter boat to the scene of the daily operations. Instead of using up to half a day in transporting the crew by marsh buggy from the nearest bayou to the daily location and then back, crews can be completely moved in within an hour on most sites.

Use of the helicopter is economically justified in those operations where it can be fully utilized. Consequently, it cannot be used indiscriminately, but is closely scheduled so as to first move key personnel to locations, and then follow up with the rest of the crew. During the day it is primarily used by those crews which are behind in schedules. For instance, in some cases shot-hole drilling may be slow, and in others surveying might not be up to schedule.

Here the operator adjusts the helicopter-mounted gravity meter preparatory to obtaining a reading.

The large box located between the helicopter's pontoons carries shot-hole drilling equipment.

An aluminum "bucket" approximately 3½ by 3½ ft. by 18 in., which fits between the pontoons of the 'copter and has arms which snap onto special fittings, is used to transport supplies. The pilot merely sets his craft down so that it straddles the bucket; the arms are snapped in place; and he takes off for the next location.

In this manner it is possible within the space of a few minutes to transport a drilling crew of four men plus their equipment the 1,000-ft. distance to the next hole, and complete three round trips in the process! Long pieces of equipment such as drill pipe, stakes, and so on are tied to the pontoons.

Surveying.—When used with the surveying crews, the helicopter ably performs the functions of lead chainman. Two flags are set up for sighting purposes, one at the check point and one a short distance away. The 'copter pilot picks up the chain—an airplane cable wire—and heads for the next spot, flying sideways so as to keep in line with the sighting flags.

A warning marker approximately 100 ft. from the end of the chain is seen by the back chainman who then signals the pilot. The pilot slowly moves the 'copter the remaining distance until the chain is completely paid out its full 1,000-1,200 ft. He then stakes the chain in position, returns to pick up the chainman, deposits him at the new spot, and they are ready to repeat the process.

Utilizing the 'copter for such diversionary tasks as with the drilling and surveying crews and for bringing in supplies increases the over-all efficiency of the seismic party as well as helps to justify the aircraft's use in addition to crew transportation.

Gravity-meter uses. — Humble gravity-meter crews use the helicopter for transportation in almost all of their marsh work. The crews have to get into many more spots than do the seismic parties and, even with the aid of marsh buggies, many of the spots would be inaccessible otherwise. By air, instruments may be moved rapidly, readings may easily be taken —frequently from inside the cockpit— and total time on station is often as low as 8 minutes including leveling time.

On good days as many as 40 to 50 new stations have been made using the 'copter, and over a period of a year, under all weather conditions, the crews have averaged 600 to 700 new stations per month. This compares to an average of 200 per month using the marsh buggy.

The operating technique with the gravity meter is quite simple. A tri-

pod is built into the floor of the helicopter, and this is released through a free hole when the 'copter lands at the new location. The rotor is brought to a complete stop to cut down on vibrations, the meter is mounted and leveled, and readings are then taken. When floating turf or otherwise bad marsh conditions cause vibrations so that even the free hole clearance is not enough, then the instruments are set up on an 8-ft.-long pipe which can be driven into the marsh.

A short accident-prevention program is given to all new men to acquaint them with the 'copter. For instance, the prop at the rear of the plane is in an unusual position compared to conventional aircraft and personnel must be made conscious of it. Then, too, nothing can be thrown out of the 'copter because of the terrific updraft which might lift light items into the overhead rotor.

The helicopters used have a 600-lb. safe load limit in addition to the pilot and may be landed on a barge at the base camp or in the marsh alongside the quarter boat.

California's Prolific Potrero Oil Field

(Continued from page 81)

flank. There is evidence for marked gravity stratification. For example, in the Fifth zone reservoir, some wells situated on the crest of the structure produce a 39°-gravity oil whereas other oil wells situated lower on the flank yield a 25°-gravity crude. Likewise, there is a marked spread of values in the magnitude of the original volumes of gas dissolved in the crude. Solution gas-oil ratios (as observed in laboratory analyses of bottom-hole samples) of crude oils from wells situated on top of the structure are nearly twice those encountered on the extreme north flank.

The Fifth zone is a fine-to-medium grained, tight sand of Miocene age. In part it grades into coarse-grained conglomeratic sand, especially on the north flank of the structure.

The top of the productive sand in the Fifth zone is found at a depth of about 8,000 ft. in the central portion of the field. The lowest productive well yet drilled logged the base of the sand at 10,959 ft., indicating an oil column of at least 2,959 ft.

Pay thickness.—The gross thickness of the Fifth zone ranges from less than 200 ft. near the pinchout line on the west to more than 700 ft. in the central part of the field. However, the average thickness of net effective saturated oil sand in this reservoir is about 240 ft. This represents little more than half of the total thickness of the sand interval. Numerous interbedded shales, siltstones, and cemented sandstone shells account for the remainder of the barren section.

Sunray Oil Corp. is the principal operator in the Fifth zone. Currently this firm is producing from this reservoir 3,406 bbl. of oil per day averaging 33° A.P.I. gravity. Cumulative withdrawals by Sunray from this reservoir were 2,920,836 bbl. to July 1, 1951. Currently there are 30 Sunray wells completed in the Fifth zone. Of this total, 20 are flowing naturally, 6 are producing on gas lift, 2 are on the pump, and 2 are shut in for gas-oil-ratio control.

Drilling and Development

Development of the field has been confronted with many varied and interesting problems. The surface topography is rugged. In many instances, very large cuts are required to level off sufficient surface space for placing the large drilling rigs required for the 8,000 to 11,000-ft. completion depths for the Fifth zone.

Well spacing.—In the past, spacing of wells at Newhall-Potrero has been planned with due regard for greatest recovery efficiency under a system of pressure maintenance. This explains why the wells are not located on the customary 20-acre geometrical pattern, although the average well density will approximate 20 acres per well.

Recently, two wells were completed on the crest of the structure which will be used for input wells when gas injection is initiated in the Fifth zone. However, these wells are now being produced in order partially to deplete the sands immediately surrounding the bore hole so as to obviate the need for displacing this oil in the movement of injected gas to the nearest producing wells located some distance away.

The crest of the structure in the Fifth zone has been drilled sparsely. Due to the high solution gas-oil ratio, wells completed on top of the structure will show a high gas-oil ratio early and would need to be shut in to avoid dissipation of the original reservoir energy. Therefore, it is uneconomic to drill wells on top of the structure because of a relatively short producing life.

Rates of penetration are relatively slow in the Newhall-Potrero area, particularly below 5,000 ft. It requires 94 days to drill and complete a Fifth-zone well. The average depth of wells completed in this reservoir is about 9,150 ft. However, actual drilled depths in the field range from 8,657 to 11,044 ft. Moreover, the drilling time required varies widely from well to well.

Completion techniques.—Normal practice calls for drilling the wells into the top of the zone. Sufficient penetration is made definitely to identify the top of the productive interval. Due to the extremely high dip slopes, it is nearly impossible to predict the depth to the top of any reservoir within 100 ft. or more.

Coring.—Once the top of the zone is located, the 7-in. casing is cemented above the top of the sand. Water-base drilling mud is replaced with an oil-base drilling fluid before additional penetration is made of the zone. This precaution is necessary due to the low productivity indexes of the sands due to the low permeability of the sands, particularly near the outer edges.

Diamond coring was initiated in 1948 with highly favorable results. The penetration rate and cost per foot compared favorably with conventional drilling without any coring. Recoveries in excess of 90 per cent were obtained, considering the heterogeneous character of the reservoir. Heretofore, conventional coring had yielded only a limited amount of incomplete sampling. To date, diamond coring has been so successful that contractors often have used the diamond heads to make hole in the Fifth zone where their contracts called for drilling solely.

Effect of steep flanks.—The south flank presents a rather unusual problem in development due to its extreme steepness. The conventional drilling assembly attempts to minimize the tendence of the bore hole to drift updip. It is highly desirable to keep the hole reasonably straight on the north flank of the Fifth zone by taking proper precautions during drilling. However, on the south flank, in order to obtain drainage from all of the sand members in the zone it is desirable to penetrate the zone at a relatively high angle, so that all sand members are intersected and can thereby contribute to the productivity of the well.

The technique now employed in development of the south flank is to locate the well on the surface somewhat beyond the edge of the structure (as shown for 89 R.S.F. on Fig. 1 in the geologic cross-section). The natural tendency of the hole to drift upstructure is taken advantage of; in some cases, the deviation of the bore hole will be as much as 25° without the need for whipstocking. This affords the means of obtaining full penetration and therefore full drainage from the south flank wells where the dips closely approach the vertical.

Gas injection.—Engineering studies of the field indicate that a higher ultimate recovery of oil and other hydrocarbon liquids will accrue from partial pressure maintenance by returning the produced dry gas to the formation after processing.

Due to the low permeability of the producing interval, the productivity of the wells in the Fifth zone drops rapidly with pressure decline. However, despite such tightness of the sand media, gas injection is believed to be promising. Moreover, the large amount of structural closure will assist control of the injected gas through natural gravity segregation.

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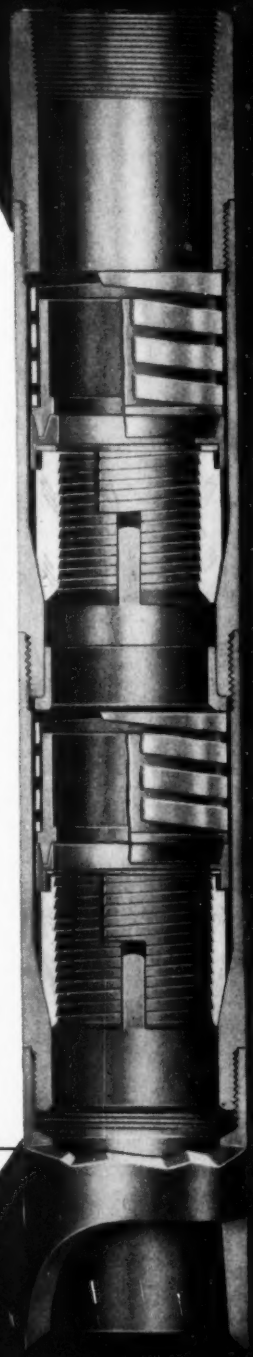

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Photogeologic Study in Kent County, Texas

(Continued from page 88)

face in the Permian basin, the photogeologist is dependent primarily upon tone and texture on the surface and to a less degree upon drainage and stream erosional patterns for his norm. Color tone of the surface is determined by soil type and moisture content; texture, also closely related to soil type, is the product principally of sheet erosion and, in coarser grain, of stream erosion. Both of these photogeologic norm elements are the results of minor relief differentials and local uplift at the surface is reflected in anomalous tonal and textural values.

Scurry County Check

These criteria were established in an initial research study of Scurry County photography in February and March 1950. This study was conducted in the absence of specific geologic data, but with a general geologic background for the basin area and the knowledge that in the vicinity of the town of Snyder lay a very large and very prolific reef. It was reasoned that if surface expression of structure were discernable in the basin, there would be one associated with this reef.

As a result of this study, three surface anomalies were delineated on the photography and were subsequently checked with subsurface maps for location and configuration of structural elements in Scurry County. Comparison of the photography with the maps was a revelation. A large quadilobular feature, centering 3 miles west of Snyder, coincided remarkably with the reef, particularly in the North Snyder and Kelly areas. A small circular anomaly was found to be the expression of Sharon Ridge Canyon and an elongate anomaly proved to be the older Sharon Ridge field, a Permian structure.

Despite diverse opinions concerning the effectiveness of differential compactness and drape over reefs, this surface expression in Scurry County significantly supports the thesis.

It has often been stated that once an oil field has been discovered, all manner of evidence for its existence becomes at once apparent. This is a profound truth. At times it is impressed upon the photogeologist because in illustrating his techniques he needs must exemplify surface expressions associated with known structures to establish validity for his criteria.

Kent County Study

Infrequently, however, there is opportunity to present a photogeologic report prepared entirely from photographic interpretation prior to exploratory drilling activity, so that a more critical evaluation of the tool may be made. Such an opportunity is afforded in this study of a portion of Kent County.

The study of the western half of Kent County was made for General American Oil Co. of Texas without any collateral geological or geophysical data whatsoever and a report submitted on May 14, 1950.

Similar to Scurry.—The surface in Kent County differs from that of Scurry County on the south only in that the normal texture is somewhat coarser because of a change in surface formation from Triassic and Cretaceous to Permian and the two sizable streams and their networks of tributaries which have effected more prominent erosional etching. Rather than altering the photogeologic criteria for anomaly recognition, this condition tends to accentuate the evidence.

Seven anomalies from a total of 18 have been selected for description, each of which illustrates some variation of the basic criteria of tone and texture.

The most prominent feature in the area is an anomaly at the big bend of the Salt Fork of the Brazos River (See Fig. 1). The dark and coarsely hummocky surface strongly contrasts with the lighter color and finer texture of the surrounding surface and is remarkably similar to that surface associated with the Snyder reef. In addition, there is sharper delineation of an encompassing lighter-toned, rougher-textured band.

Compound anomaly.—As is frequently the case with anomalies as large as this, it was found that this one was compound and divisible into three separate elements: (1) an elliptical outline for anomaly No. 8, narrow in the southwestern arc and broadening in the northeastern portion, (2) anomaly No. 6, a smaller circular feature here, and (3) anomaly No. 5.

Such close relationship of anomalies in the basin is common. Small anomalies sometimes display coalescent evidences in which the outlines of two features overlap to such a degree as to interlock or there may be a coaxial pair of outlines, a small one nested within a larger second one. In such cases as this, the surface evidences are shared and the anomalies are considered mutually supporting.

Anomalies 4 and 5 illustrate coalescence of evidences. (See Fig. 2). Here a small elliptical anomaly with a very coarse outlining band overlaps the third element of the before-described compound anomaly to form a crude figure "8." Though the two bands are clearly distinguishable, the anomalies are virtually inseparable.

Coaxial banding.—An illustration of coaxial banding occurs in anomaly No. 2. (See Fig. 3). There is a central core here consisting of lighter-toned, smooth-textured surface, which is surrounded by a dark-toned, rough-textured band. An outer, all-encompassing, heavily textured second band may be seen, separate and distinct from the first.

It is interesting to note that there is corroborative anomaly evidence in local drainage peculiarity. Though the Double Mountain Fork of the Brazos River is a characteristically meandering stream, nowhere along its course may this tightly compressed, entrenched meander pattern be duplicated. It is restricted to these anomaly limits. In addition, McKenzie Creek, which in the south flows in a due-north direction, at this point is deflected eastward to a position between the two anomaly bands.

Independent of topography.—Excellent demonstration of the ineffectiveness of topography to alter or destroy photogeologic evidence is to be had in Fig. 4. This anomaly lies in a highly dissected area. It presents a dark-toned and coarse-textured center which incorporates some rather rugged topography on a divide between two streams. The associated band is broad, comparatively smooth and lighter toned.

The same type of anomalous evidence in gently rolling terrain is exemplified in anomaly No. 7, where there is little textural contrast between anomaly center and outlining band. (See Fig. 5). What is interesting is this linear erosional remnant here, which for 2½ miles is straight, abruptly bows into a gentle arc coinciding with anomaly band here, and then straightens out again east of the anomaly. Minor drainage lines accentuate the band outline.

PART 2—By G. Frederick Shepherd

THE second part of this paper is a case-history report of exploration in western Kent County, particularly in respect to those wells drilled on or because of photogeologic anomalies. Illustrating this paper are two maps showing the status of development in Kent County: one, as of May 14, 1950, the other as of approximately April 1, 1951.

Prior to the earlier date, the author had occasion to observe certain relationships between the geographic distribution of photogeologic anomalies and Canyon reef producing areas in Scurry County. The coexistent relationship was remarkable and undeniable and of importance even without a full understanding of any essential genetic explanation for their coincidence. To my knowledge the delineation of the photogeologic anomalies preceded the comparison with the areas of reef production.

Because of the indicated relationship between photogeologic and sub-

surface anomalies, General American Oil Co. of Texas wished to observe the results of drilling in Kent County following a photogeologic study. A map showing the location of photogeologic anomalies in western Kent County was received by this company May 14, 1950, and the results of wells then drilling or contemplated were observed.

In order properly to evaluate the results of this program, the anomalies should be redefined and their claims clearly stated. A photogeologic anomaly was described as a surface feature observed on areal photomosaic maps, this feature standing out as anomalous in respect to textural or tonal bands expressing minor differences in soil and moisture content.

De Blieux recognized these features and delineated them on a map strictly as observed and without qualification. Their identification was immediately recognizable. Because of the method used, it was stated by him that the boundary of an anomaly must be considered as the approximate position of the subsurface anomaly without any precise or delimiting confine.

It was stated that the photogeologic anomaly was a reflection of subsurface structure, defining that term as any trap in which oil might accumulate which could be reflected on the surface. When compared with the Kent County development map of May 14, 1950, it was shown that the photogeologic anomalies depicted, represented low-relief small domes, such as Polar field in southwestern Kent County; high-relief bioherm reef buildups, such as Cogdell field in southern Kent and northern Scurry counties; or poorly defined, possibly open structures such as may represent the accumulation of isolated Strawn production, as Spires field, southwestern Kent County.

No claim other than that the photogeologic anomalies reflected subsurface anomalies was made, nor was there any claimed differentiation of those anomalies which might be associated with bioherms and those which might reflect small domal uplifts. No suggestion was made of the accumulation of oil or gas in these structural anomalies prior to penetration of the drill.

Anomalies Drilled

Encouraged by these results General American elected to drill four wildcat tests on photogeologic anomalies previously untested and without any subsurface or geophysical data in their possession. If one considers the use of photogeology as an exploratory tool, essentially of reconnaissance value only, it would appear unorthodox to employ this tool alone as a direct means for determining the location of a wildcat test. Unorthodox it was then, that General American elected to depend on the observation of results of drilling on these anomalies and further to project the drilling of a group of wildcats located solely by this means. This, however, was done and the results are here disclosed.

Results.—In western Kent County is shown a group of 18 photogeologic anomalies. A map showing the location of these anomalies was delivered on May 14, 1950, and the wells then drilled are shown on Fig. 6. Twelve Canyon Reef producing wells and one Wolfcamp producer had been drilled in Cogdell field on anomaly No. 17. Four Ellenburger producers had been drilled in Polar field on anomaly No. 18 on a small structure with about 50 ft. of closure. Two Strawn wells had been drilled in Clairemont field on anomaly No. 3. The discovery well of Salt Creek field, drilled to the Mississippian and plugged back to the Canyon Reef, had been drilled on anomaly No. 8.

Four other producing wells had been drilled, on the edge of photogeologic anomalies Nos. 1, 2, and 7. On the first of these, one well had been drilled to the Strawn with a slight show of oil, had about 125 ft. of Reef lime with no shows, and was plugged back for a 12-bbl. well making 85 per cent salt water in the San Andres. The other was drilled only to the San Andres and completed as a producer. The Barnsdall 1 Spires on the edge of anomaly No. 2 had been drilled to the Ellenburger, had no Canyon Reef, and was completed as a Strawn producer. The same was true of the Lohman 1 Young on the edge of anomaly No. 7. These wells were not considered by General American as true tests of these anomalies although they strongly suggested that they may have been close to or on the edge of structures in which production might be found by further drilling.

The wildcats drilled south of Salt Creek field were drilled to the Ellenburger or granite, had no Canyon Reef, and no significant shows. The five wildcats in northern Kent County presented a problem yet unsolved. The Big Chief 1 Lowe was not drilled at this time and is on this map in error. The four wells between anomalies Nos. 13, 15 and 16 encountered several hundred feet of Canyon or younger reef, locally high, had minor but significant shows of oil, and all failed to find commercial production. The Hunt 1 Girard, in anomaly No. 11, was drilled to the Ellenburger with no shows, but had 157 ft. of anomalous reef-type limestone. The history of these wells was interpreted by General American as supporting the contention that the photogeologic anomalies were reflections of subsurface structural anomalies and none stood out in contradiction.

On May 14, 1950, there were 17 wells drilling, none of which had reached total depth. Seven of these were Cogdell field wells completed as Canyon Reef producers. Four were similarly located in Salt Creek field, and one in Clairemont field. Significance was attached to the results of the remaining five wildcat wells. Heyser 2 Lohman was completed as a 2-mile extension to Salt Creek field and in the previously undrilled anomaly No. 6. Kewanee 1-C Wil was drilled in anomaly No. 1 and was completed as the discovery well of East Polar field. Spartan 1 Wallace was drilled south of the Lohman well on the edge of anomaly No. 7 and was carried to the Ellenburger. There was no reef porosity in this well. Oil and gas shows were encountered in the Strawn, none of which were of commercial significance and the well was abandoned. Seaboard 1 Wallace, wildcat south of Clairemont, was abandoned in the Mississippian with no shows. The Armer 1 Girard, near the Dickens County line, was drilled to the Ellenburger and had no shows, but did encounter 140 ft. of anomalous reef-type limestone similar to that in other wells drilled in this area.

The drilling of these wells further substantiated the observations previously noted. Subsequently, General American secured farmouts of acreage and commenced drilling its first wildcat of a series a month after the completion of the above wells. The 1 Atkins in anomaly No. 4 was drilled into the Strawn in which a 4-hour drill-stem test had gas to the top in 3 hours and 48 minutes, and recovered 150 ft. of free oil and 550 ft. of salt water. This oil show is indicative of conditions essential for the accumulation of oil and is considered the result of a subsurface anomaly. Confirmation was further strengthened by penetration of 120 ft. of Canyon Reef limestone topped, however, approximately 200 ft. below the water level of Salt Creek field.

General American 1 Spires in anomaly No. 2 was the second test of the series drilled. This was completed as a Strawn producing oil well and thus confirmed the presence of a subsurface anomaly. The firm's 1-A Beggs, in the center of anomaly No. 7, was drilled to the Mississippian. A drill-stem test in the Strawn, open 5 hours, 35 minutes, had gas to the surface in 20 minutes, and fluid in 45 minutes. The well flowed pipeline oil at a rate of 21 bbl. per hour at the beginning of the test and was making 95 per cent salt water at the close of the test. Although the well was abandoned as a dry hole, this evidence of oil accumulation again confirmed the presence of a subsurface anomaly. The fourth of these wildcat tests, the 1 Chalk, was drilled in the center of anomaly No. 9. The well bottomed in the Strawn and had no shows and no definite section of anomalous reef-type limestone and therefore failed to confirm the photogeologic anomaly.

Summary of Results

In summary, three of the untested photogeologic anomalies of May 14, 1950, were drilled and found new oil

production, 1, 2, and 6. Two others, 4 and 7, were confirmed as subsurface anomalies by the presence of oil and in one case by the presence of a substantial thickness of anomalous reef-type limestone. Only one of the six, 9, failed to be confirmed in any recognizable way.

Before concluding this case-history report I wish to review the observations on the 18 anomalies, without consideration of the chronological sequence. Production has been obtained on seven photogeologic anomalies (17 1, 18, 2, 3, 6, 8). Five others have been confirmed by evidence of subsurface anomalous conditions (4, 5, 7, 10, 11). One has failed to be proved related to a structural anomaly (9). Three, undrilled, are located in the area known to be abnormally high due to reef buildup and are related to the Swenson structural problem yet unsolved (13, 15, 16). The two remaining anomalies have not been tested (12, 14).

Three other areas should be noted to complete the record; these are producing areas in which no photogeologic anomalies were observed and therefore should be included in the statistical record as failures. The isolated Ellenburger production in the Star 1 Young well, on the Garza County line, offset by two dry holes, is an area that would not have been drilled in this program. The Kewanee-1 Oliver, completed only a short time ago north of Salt Creek field, is producing from Canyon Reef topped higher than the north edge of Salt Creek field and established saturation below the water level of that field. The absence of any photogeologic anomaly here again places this as an exception to the record noted.

By the same token it should be stated that the northern extension of Cogdell field, even though drilled in a normal development sequence of that field, has continued too far from the location of anomaly No. 17 to be included as part of that anomaly and no well in this program would have been drilled as a remote wildcat from this production.

The facts observed, therefore, are that of the 13 drilled anomalies, 1 failed to confirm a subsurface anomaly and 3 evidences of subsurface structure were not reflected as photogeologic anomalies. The purpose of this paper, however, is to present the results of drilling on four untested anomalies where their existence was the sole cause of the wells being drilled and three of these substantiated subsurface anomalies. The other two, not drilled by General American, but part of the observation of the six untested anomalies, resulted in producing fields. The net results were five successes and one failure out of six wildcat prospects drilled.

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Venezuela's first National Petroleum Convention will be held in Caracas September 9-18, 1951. On the eve of expansion to meet world requirements, oil men from all corners of the world will meet in Venezuela to discuss their mutual problems.
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Oxygen Measurement

(Continued from page 92)

possible to mount the recorder at a remote point on a panel and the analyzer close to the point of measurement.

Sampling system.—A typical gas-sampling system for a process heater or boiler is shown in Fig. 6. A primary refractory filter is installed on the end of a special support pipe containing a glass insert. The glass insert extends from the filter, through a packing gland, to the outside of the setting. Glass tubing, fittings, and rubber connectors are used to carry the gas to the analyzer. Where the system is subjected to freezing temperatures, it is necessary to steam trace the lines.

Either a water or air-operated aspirator can be used to draw the sample to the instrument. A differential aspirator is recommended because it maintains a constant differential across the analyzer and will provide more stable flow conditions. Sample flow control is not too critical since the actual measurement is practically independent of flow. The use of the differential aspirator also makes it possible to run one line, through which condensate can drain, directly to the aspirator. A moisture separating Y and a bypass through the analyzer permit a condensate free sample to flow through the gas passage block.

Applications in cat cracking.—Another application for the oxygen recorder is the measurement of oxygen in the flue gases from the regenerator on the catalytic cracking unit. Too little oxygen may result in the burning of too little carbon and spoiling of the catalyst. An excessive amount of oxygen may cause secondary burning of the carbon monoxide present causing serious damage. The gas-sampling system for this application is shown in Fig. 7.

The pressure in the flue is used to force a relatively large sample of gas through a cyclone separator and either back to the flue or to atmosphere. The high-velocity sample flow improves the response time and also the separating action. The sample through the separator is held at high temperature to prevent condensation.

A refractory filter is installed in the center of the cyclone separator and only about ½ cu. ft. of gas per minute is forced out to the analyzer. The gas is carried to the analyzer through glass tubing and suitable fittings. A differential bubbler maintains a constant differential across the analyzer and provides for condensate drainage.

There are many other applications for the oxygen recorder. It can be used to check the oxygen content of blanketing gases, conveying systems, furnace atmospheres, and some gas mixtures.

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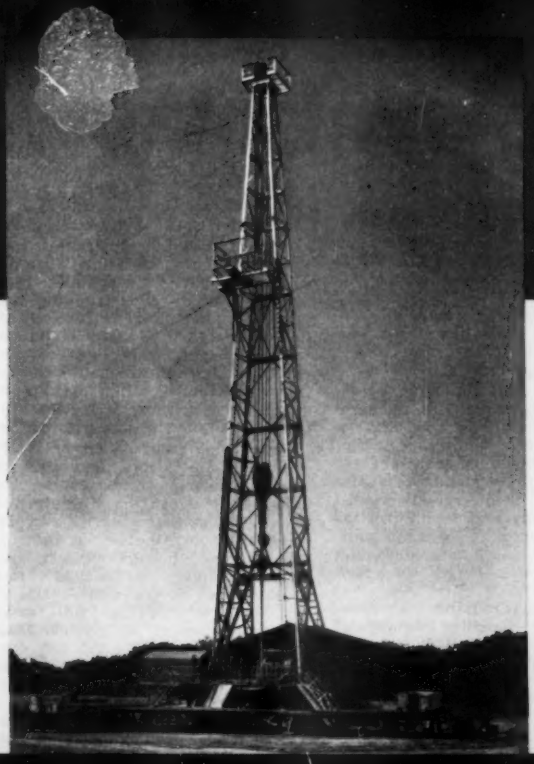

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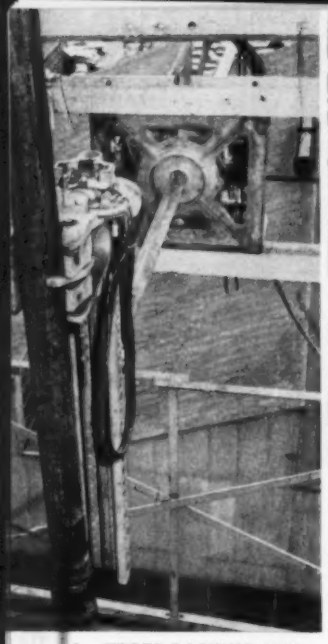
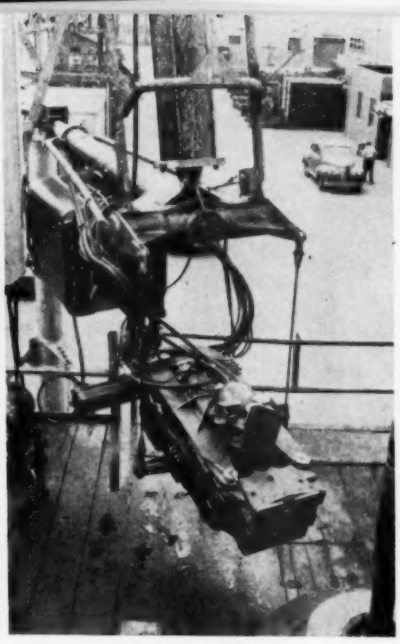


1—UPPER RACKING ARM

2—AIR-OPERATED ELEVATOR



3—POWER-OPERATED TONGS

1. From his stationary platform the derrick man manipulates this racker through a single control to stack drill pipe in derrick. 2. Driller from his control station operates the pneumatically operated elevators. 3. The floor man seated at the master control console operates these air-powered tongs.

more time on bottom

FOR years the oil industry has endeavored to devise ways and means of keeping its rotary drilling tools staying on bottom for a longer period of time, and at the same time reduce the hazards in conjunction with the handling of drill pipe on round trips.

After 6 years of research and field testing, power-operated pipe-handling equipment which eliminates much of the fatigue in drilling operations has been placed in commercial production. Drill pipe can be run in and out of the hole without any member of the crew touching the pipe.

All of this equipment is power operated and remotely controlled with the specific idea of cutting round trip time by 25 to 30 per cent.

With this new equipment, a three-man crew consisting of driller, derrick man, and floorman can make round trips with the drill pipe. From comfortable seated positions, the three men operate the pipe-handling equipment by merely turning control knobs and levers.

According to the manufacturer, Byron Jackson Co., the power equipment is particularly adapted to deep drilling. The trend toward deeper drilling has resulted in more horsepower being required for hoisting long strings of drill pipe. As a corollary, the weight of drilling equipment to meet these peak demands has increased. Byron Jackson engineers have had the assistance and cooperation of the engineering staff of one of the larger domestic oil companies in the perfecting of this advanced and completely different power-operated pipe-handling equipment.

The duration of repetitive operations, especially round trips, increases greatly with depths, so much that below 10,000 ft. often more time is consumed changing bits than drilling. Harder formations found at greater depths reduce bit life rapidly, resulting in more frequent round trips as the bit goes below 10,000 ft. In addition, more rig time is consumed and the hole left open longer, an added blowout hazard.

With these facts in mind, the power-operated pipe-handling equipment was developed with the twofold purpose of faster round trips and increased safety. Five basic equipment items are now being manufactured. They are:

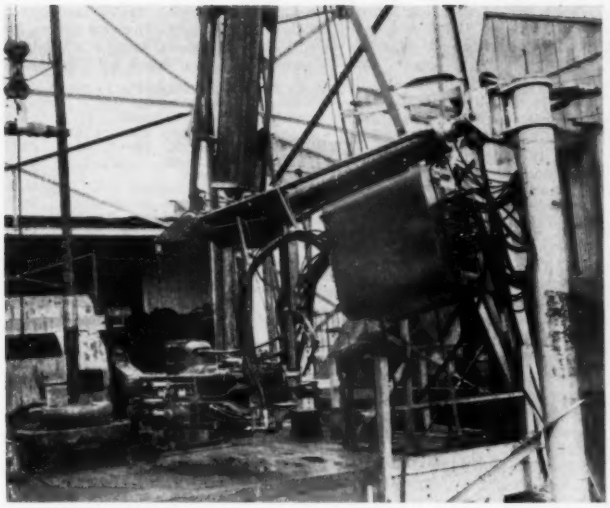
1. Remotely controlled power pipe racker.
2. Power elevator.
3. Remotely controlled power tong unit.
4. Power slips.
5. Master control console.

From a safety standpoint, this new equipment eliminates the dangerous spinning chain and tong lines. Also, the hazards of pipe handling and racking on the floor are greatly reduced. Most of the hazards of the old "monkey board" are eliminated because the derrick man now performs his work from a sitting position on an enclosed platform, remotely controlling the elevator and pipe racker.

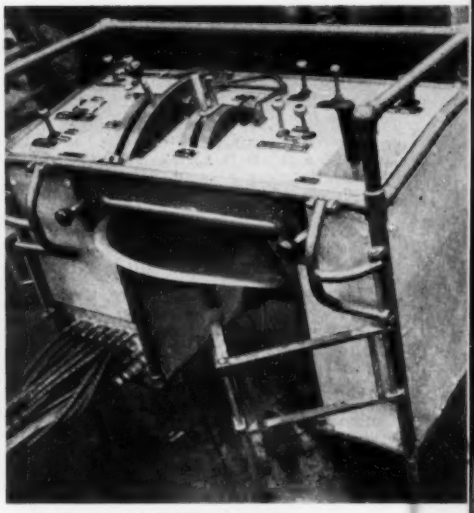
Power pipe racker.—This remotely controlled unit actually consists of two air-motor-powered, chain-drive units, one between the eleventh and twelfth girths of the derrick and the other just above the first girth.

Each arm of the racker can be controlled for travel into and out of the working area of the derrick and is also track mounted for full travel across the sides of the derrick. Thus the racking arms can reach any portion of the derrick (on a horizontal plane) without the derrick or floorman leaving his seated position.

On the end of the lower racker arm is a claw which encircles the pipe on contact. This claw consists of a U-shaped fork which encloses 180° of the circumference of the pipe. A hydraulically operated latch is



4—TONGS—SIDE VIEW



5—MASTER CONTROL CONSOLE

4. Here the air-powered tongs are seen from a position opposite that of 3. 5. From this master control the floorman manipulates the tongs and lower pipe racker. Mechanism of the lower pipe racker is similar to the upper racker. Makeup torque on tool joints can be properly controlled for all sizes from 4 to 8¼ in. o.d.

with new power-operated pipe-handling equipment

Three-man crew, driller, floor man, and derrick man, can make round trips with the drill pipe

closed around the pipe by operating a valve. Control of the upper racker is through a single control "joy stick" operated by the derrick man from his stationary platform.

The lower pipe racker is much the same as the upper, except that control is through the master console. An auxiliary elevator is provided to support the weight of the pipe and transfer it to the pipe mat. The auxiliary elevator consists of a U-shaped member which is built to fit around the pipe being racked. A hydraulically operated spring return claw with teeth located in one leg of the U-shaped member is rotated into engagement with the pipe for hoisting and backing up pipe while rotating out. A pneumatic cylinder, mounted at the water table, is connected by a cable to the auxiliary elevator and is controlled from the control panel on the derrick floor.

Power elevator.—Compressed air does the work in deflecting the traveling block and operating the elevators. Two air-actuating cylinders mounted on the traveling block deflect the block by means of small wire lines from a carriage on the special derrick rail. Countertensioning keeps the block at a uniform 3 ft. off center as high as the monkey board, above which the block approaches the center of the derrick.

The elevators are latched and unlatched by air operation and are controlled by the driller. Coming out of the hole, the stand is pulled up into the derrick and the slips are set. The derrick man moves the upper racking arm to grip the top of the stand. The driller on the derrick floor trips the elevator release and deflector valve, which sidetracks the block as it is lowered by the driller control. The stand is then broken out using the power tongs and racking arms. Going in the hole, reverse procedure is used.

Remotely controlled tongs.—These power-operated units consist of two pipe-gripping units suspended from a telescoping arm clamped to the derrick leg. A hydraulic cylinder controls the height of the tong from floor level to operating position.

The tongs consist of power-operated jaws in frames with gates and latches. The upper jaw contains spinning rollers driven by an air motor and the gate has idler rollers which extend for spinning and retract for tonging.

The tongs have a range from 4 to 8¼-in. o.d., and are capable of properly controlling the makeup torque on tool joints within this range. They have enough breakout torque to break the tightest joints.

Power slips.—This equipment is pressure raised and pressure set by the touch of a foot pedal. Pipe is pressure centered, assuring on-center gripping of slips. The "packaged piston-rod flange assembly," containing builtin pressure-relief valve and pilot-operated safety valve, are outstanding features. The pressure-relief valve releases the air in the upstroke portion of pressure cylinder in the event the arm ring is accidentally struck by the elevator. The pilot-operated safety valve holds the slips in position in the event of an air-line failure. In addition, a builtin throttle-control valve permits the operator to manually adjust the unit to the desired operating speed.

The slips can be unitized with the rotary table and installed and moved as a unit with the table. Only a small subbase is required, and no changes in the rig structure are normally required.

Side opening permits quickly placing slips in proper operating position around pipe and removing them just as easily. The slips rotate with rotary table without roller-bearing contact with slip ring. Powerful air-operated cylinder provides for pressure raising and setting of slips. Two simple air-hose connections provide the foot-pedal control from driller's position. When swinging slips into

operating position, spring-loaded latch centers slips and holds them over rotary table. Latch is easily released by hand when moving unit out of working position. Only 90 lb. of air pressure is required for these slips to operate.

Standard equipment includes a pressure regulator to govern pressure. Positive lubrication is assured with a line lubricator which provides automatic lubrication of control valves and power cylinder. Slip ring rollers and slip carrier rollers are easily lubricated through Alemite fittings.

Master control console.—Here the power controls are centralized into one board. The floorman sits at the control console and operates the tongs and pipe racker from one position. Not only does this speed up the operations, but it allows complete coordination through one man.

The derrick man still operates the upper racker and the driller operates the draw works, elevator, and power slip, thus making the entire drilling run a three-man operation.

Stanolind Electrifies Cedar Lake Field

(Continued from page 85)

encountered in the control units due to alkali dust blowing into them, causing overheating and "shorts."

Low power factor which is typical of oil-field pumping loads, presented no difficulty initially as was expected, while electric-power consumption was low. However, as the load increased on the electric system, it became necessary to install capacitors to increase the power factor, thus making it possible for the plant generators to operate at full rated power output.

Capacitors of 5-kva. rating were installed at each pumping motor, with connections being made at the line side of the controllers for continuous operation of the capacitors. While this connection method is frequently advantageous with purchased power, in this case it resulted in excessive loading power factors during periods of light load.

This objectionable condition was soon corrected by reconnecting some of the capacitors to the load side of the associated controllers.

The over-all field power factor has been raised from a value of 0.55 lagging, before installation of capacitors, to values up to a maximum of about 0.85 lagging after capacitors were installed, partly on the load side and partly on the line side. An average load condition of 25 to 30 amp. at 4,160 volts will have an average power factor of 0.80, lagging.

Some trouble was experienced from the two operating generators failing to share the load equally without producing rather large circulating currents. This condition resulted from faulty regulating equipment which has since been replaced.

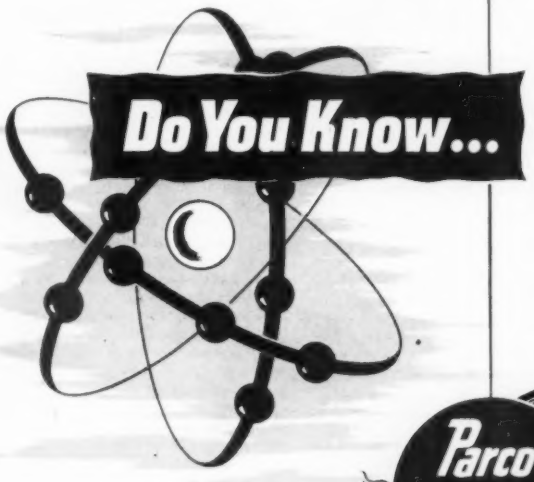
TYPICAL OPERATING DATA—FEBRUARY 1951

Number of wells pumped	43
Gross oil production pumped by generated electric power, bbl.	50,019
Electric power, kwh.	
Total generated	143,600
Used for well pumping	72,994
Used for pipe-line pumping	54,606
Used for camp, station auxiliaries, etc.	16,000
Direct operating costs:	
Fuel-gas cost	$ 234.35
Operating labor	716.47
Repairs and misc. costs	109.65
Total	$1,060.48
Per kwh. (total) cent	0.74
Pumping power:	
Kwh. per barrel of oil pumped	1.46
Cost per barrel of oil pumped (cent)	1.08

BOOKS

THE ROYAL DUTCH PETROLEUM CO. (N. V. KONINKLIJKE NEDERLANDSCHE PETROLEUM MAATSCHAPPIJ) 1890-1950. Published by the Royal Dutch Petroleum Co., The Hague, the Netherlands. 206 pp.

This book traces the entire history of the large Royal Dutch-Shell group, and carries pertinent data on the company's exploration, production, and processing of petroleum; its chemical-industry activities, transport, scientific research, marketing, and its personnel setup. The work is generously illustrated with photographs of operations in various phases of the company's operations, in all parts of the world. A large multicolor map is included, showing location of various activities of the company throughout the globe.



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— MORE THAN MORE OIL —

Edmonton, Canada. You get unmatched service because McCullough will go anywhere, anytime to do your perforating. In Canada, it is common for McCullough crews to fly hundreds of miles—in winter or summer—to bring fast, efficient service to remote wildcat areas. Perforating is accomplished without the need of electrical equipment, since McCullough Gun Perforators can be fired either mechanically or electrically—an exclusive McCullough feature!

— MORE THAN MORE OIL —

Fox, Oklahoma. You get more types of guns, more sizes of bullets, and the maximum safe charge of explosives in small pipe, where MORE POWER is needed. In this particular well, 4½" drill pipe was set due to the scarcity of casing. Ordinary jet perforators could not do the job, due to the small charge of explosives necessary in a small O.D. rigid body gun. The McCullough Glass Jet Perforator with a Steel Strip Carrier permitted the use of the maximum safe charge of explosives, resulting in a successful gas well.

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Billings, Oklahoma. You get the best perforating job possible, regardless of the size or number of casing strings in your well. On this particular job, one service company refused to attempt perforating due to the thickness of the casing, the number of strings, and the large amount of cement behind the pipe. This job, witnessed by representatives of four oil companies, was shot with the McCullough Glass Jet Perforator. Quantities of water were produced after perforating. Another service company attempted to perforate with a large open hole jet charge but failed to improve results.

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Houston, Texas. New McCullough Glass Jet Perforators now achieve .759% greater penetration, through solid steel plate, with .375% LESS explosives—by actual surface tests! In competitive tests no other perforator even approaches it! In addition to more oil this means less chance of damage to the casing in your well. Another improvement has been the use of a 50% stronger steel strip carrier, eliminating the possibility of debris.

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QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Relative Cost of Coal Or Oil Firing

We are considering conversion from coal to oil. What are the factors that are most important and can you advise regarding the costs of firing?—R. P. C.

A simple comparison of the heating values of the two fuels is not enough because the handling operations and firing conditions are very different for the two fuels. The heating value of A.S.T.M. No. 6 or Bunker C fuel oil is nearly constant at about 18,000 B.t.u. per pound whereas that of coal varies somewhat. The number of barrels of fuel oil that is equivalent to a ton of coal, on a basis of heating value alone is indicated in Table 1. As one example, fuel oil delivered at $2.15 per barrel would (on a heating-value basis) compete with delivered coal (13,000 B.t.u.) at $8.87 per ton. It is obvious that transportation or delivery costs are vitally involved in such a comparison.

TABLE 1—BARRELS FUEL EQUIVALENT TO A TON OF COAL

Heating value of coal as fired B.t.u. per lb.	Barrels of fuel oil*
12,000	3.81
13,000	4.13
14,000	4.45

*Gross heating value, 18,000 B.t.u. per pound. A.P.I. gravity 10.0°.

Another consideration is the cost of handling and firing. Among the advantages of oil firing are the following:

1. No deterioration of oil in storage.
2. Storage may be distant from boiler.
3. Freedom from spontaneous combustion.
4. Weight 30 per cent less and space occupied about 50 per cent less than coal of an equivalent total heat content.
5. High combustion rates per cubic foot of furnace cavity.
6. High efficiency and practically no smoke.
7. Absence of wear on machinery because of no dust or ash.
8. Great flexibility in adjusting boiler to load requirements.
9. Labor not required to remove ash or cleaning fires.
10. Low labor cost to clean boiler tubes and no labor to move fuel to the furnace.
11. Low pressure drop through boiler.
12. Excess air required is lower.
13. Fuel is immediately available and it may be stored or withdrawn with a minimum of labor.

A comparison of handling and firing costs is difficult because of the various conditions encountered; however, the following points might be considered. With respect to coal:

1. Cost of equipment, i.e., bins, stokers, grates, etc.
2. Cost of handling, i.e., unloading, storage, etc.
3. Cost of firing, i.e., coal passers and/or power for stokers.
4. Cost of removing ash.

And with respect to oil firing:

1. Cost of storage, i.e., tanks, lines, etc.
2. Steam and pumps to heat and pump oil.
3. Power or steam required for atomization.

Finally, it is generally agreed that oil can be fired at a little higher efficiency, or with a little less excess air.

This department is not able to estimate the cost of coal firing, but one expert advises that the cost ranges from $0.65 to $2.70 per ton as of 1950.

The cost of small oil-storage tanks (250 to 2,500 bbl.) is now $2.80 to $9.00 per bbl. Based on an investment of $10 for each barrel of oil in storage, including lines, pumps, tanks, controls, burners, etc., the interest and depreciation charge over a period of 10 years, is less than 0.4 cent per barrel of oil fired. Steam is a larger item. The steam required for pumping (2 parts recirculated for 1 bbl.) is about 4 lb. per barrel; the steam required for heating may range from 15 to 25 lb. per barrel; and that required for atomization would range for inside mix burners from 60 to 150 lb. per barrel. This total consumption of 80-180 lb. per barrel costs from 2 to 6 cents per barrel fired. Efficiency of combustion is also not of great significance. An increase in efficiency from 75 per cent with coal to 78 per cent with oil only represents 1.5 to 2.5 cents per barrel. The cost of labor is almost entirely dependent on the amount of oil fired per day or per shift, but if only 20 bbl. is fired per shift by one fireman, the cost of labor is $1 per barrel, whereas if 100 bbl. are fired by two firemen per shift, the labor charge is only 40 cents per barrel or only 20 cents if only one fireman is employed. Regardless of these figures, it is obvious that coal firing requires as much or more labor than oil firing.

Note that all of the charges in the above paragraph should be multiplied by about 4.0 (3.8 to 4.45) if they are to be compared with per ton costs for coal. Thus, for firing the oil equivalent of a ton of coal:

Oil-equipment depreciation	1.6 ct.
Steam or power	8-24 ct.
Firemen	0.80-4.00
Efficiency saving	6-10 ct.

The "firemen" cost would presumably be the same for coal and hence, the labor or power to pass or handle the coal could be compared generally with the "steam or power" cost of 8-24 cents for oil. An extreme in coal handling cost would be shoveling, and if one workman can handle 1 ton per hour (1.2 cu. yd. per man hour) the handling charge is in excess of $1.50.

All of the above leads to a general conclusion that oil can be fired more cheaply than coal by at least 15-25 cents per ton of coal, and very much more cheaply if the coal is shoveled. The 15-25 cents per ton is not a large figure, amounting to only 3 to 6 cents per barrel of fuel oil.

Thus, the entire comparison finally comes back to what the costs of coal and of fuel oil delivered at the plant may be. This will be investigated next week.

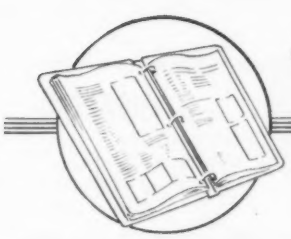
Thinks Viscosity Index Not Practical

In the low range of viscosity, the accuracy with which viscosity can be determined is about 0.5 per cent. This leads to great variations in viscosity index. Some other method than viscosity index should be devised so that this misleading situation will not exist. What can be done about this?—J. J. B.

The answer to the question can only be undertaken by the specifying agencies such as the American Society for Testing Materials and others. Although viscosity index is probably too sensitive an index, nevertheless, it must be pointed out that inadequacies of the methods of testing viscosity are not the fault of Viscosity Index. In this connection, the kinematic type of viscosity equipment was adopted in 1937-1946 partly to help in obtaining more consistency with viscosity-index determinations. Viscosities by the kinematic method are generally accurate to within about 0.2 per cent.

What J. J. B. objects to may be illustrated by comparing the viscosity indexes obtained when the viscosities at 210° F. are 0.3 second in error:

Vis. at 100° F.	Vis at 210° F.	V.I.
113	40.0	81.0
113	40.3	93.0
113	40.5	0
143	41.5	60.5
143	41.7	64.5
143	42.0	79.0
143	42.3	88.5
143	42.5	94.0
837	74.0	77.0—
837	75.0	80.0
837	76.0	83.0+



THE REFINER'S notebook

No. 79

Factors Affecting Throughput in Cat Cracking

by P. M. Reynolds*

PART 3—HEAT BALANCE

THE heat balance for Case 1 (coke laydown equal to 6.0 per cent fresh feed) was given in the preceding installment of The Refiner's Notebook. Case 2 heat balance (coke laydown equal to 5.5 per cent fresh feed) is here presented. Fresh-feed and conversion rates are the same in each case. The material balance previously given for Case 1 also applies to Case 2.

HEAT BALANCE—CASE 2

Coke laydown:
= 5.5 wt. per cent of fresh feed
= 14,025 lb./hour
Hydrogen in coke:
= 0.9 wt. per cent of coke
= 1,262 lb./hour
Carbon in coke:
= 91.0 wt. per cent of coke
= 12,763 lb./hour
Gasoline plus gas products:
= 255,000 — 115,600 — 14,025
= 125,375 lb./hour
Air to regenerator:
= 174,150 lb./hour
Water of combustion of coke:
= 1,262 × 9 = 11,360 lb./hour
Total flue gas from regenerator:
= 174,150 + 14,025
= 188,175 lb./hour

A. Heat Balance of Regenerator (Basis 32° F.)

1. Heat into regenerator—	B.t.u./hour
Combustion air in at 300° F. = 174,150 (300 — 32) (0.241)	= 11,250,000
Sensible heat of coke at 900° F. = 14,025 (900 — 32) (0.60)	= 7,307,000
Heat of combustion of coke = 14,025 × 14,500	=203,363,000
Total heat out of regenerator excluding cat. circulation	=221,920,000

2. Heat out of regenerator—	B.t.u./hour
Sensible heat in flue gases = 188,175 (1,075 — 32) (0.269)	= 52,877,000
Latent of water in flue gases = 11,360 × 1,075	= 12,212,000
Heat loss out of regenerator insulation	= 1,000,000
Total heat out of regenerator excluding cat. circulation	= 66,089,000
3. Heat available to circulating catalyst = (221,920,000 — 66,089)	=155,831,000

B. Heat Balance of Reactor

1. Heat required in reactor: Heat and vaporize feed in at	B.t.u./hour
100° F. = 255,000 [135 + (900 — 100) (0.710)]	=153,765,000
Heat and vaporize recycle in at 400° F. = 65,050 [119 + (900 — 400) (0.656)]	= 29,077,000
Heat of reaction = 125,375 × 95	= 11,911,000
Heat dispersion steam = 10,000 (1,611 — 1,250)	= 3,610,000
Heat loss through reactor insulation	= 600,000
Total reactor duty required	=198,963,000
2. Heat from circulating catalyst	=155,831,000
Heat put in feed by furnace	= 43,132,000

3. Feed heater outlet temperature (assume no vaporization):

$$\text{Temp. diff.} = \frac{43{,}132{,}000}{251{,}000 \times 0.587} = 282^\circ \text{ F.}$$

Furnace outlet temperature
= 100 + 282 = 382° F.

C. Catalyst Circulation

$$= \frac{155{,}831{,}000}{(1{,}075 - 900)\ (0.270)} = 3{,}294{,}000 \text{ lb./hour}$$

or = 27.5 tons per minute

D. Catalyst/Oil Ratio

$$= \frac{2{,}906{,}000}{255{,}000} = 12.9 \text{ to } 1 \text{ on fresh feed}$$

$$= \frac{2{,}906{,}000}{255{,}000 + 65{,}050}$$

= 10.3 to 1 on throughput

E. Fresh Feed Possible in Case 2 if Coke Burning Rate Maintained at 15,300 Lb. per Hour as in Case 1

Case 2 new fresh feed

$$= 20{,}000 \text{ B.P.D.} \times \frac{15{,}300 \text{ lb./hour}}{14{,}025 \text{ lb./hour}}$$

or

$$= 20{,}000 \text{ B.P.D.} \times \frac{6.0\%}{5.5\%}$$

= 21,820 B.P.D.

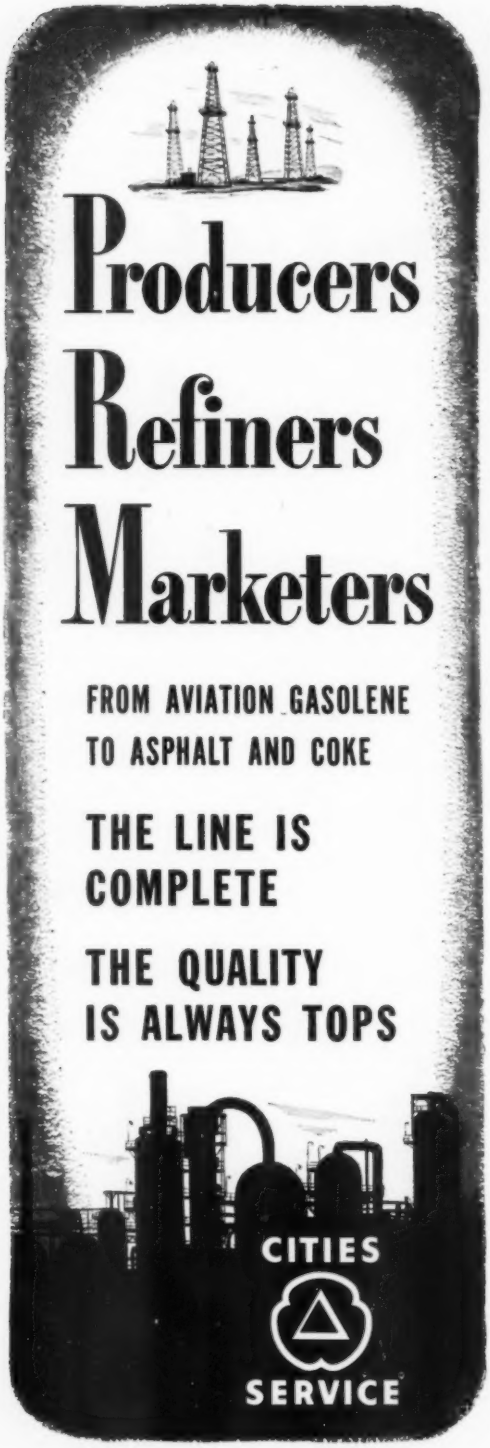
Coke laydown.—The change in coke laydown occurring in the operation of the cat cracker may be attributed in this case to a change in nature, or source, of feed. Fresh feed and recycle rates and reactor temperature were held the same in both cases so as to best show the relationship between the variables. In actual operation, feed and reactor temperature would be varied so as to maintain maximum coke burning in the regenerator since the coke burning capacity is usually the limiting factor in a suit. In Case 1, the feed furnace outlet temperature was down to 310° F due to the large amount of heat liberated in the regenerator by the combustion of coke. In Case 2, the coke was down to 5.5 per cent of the feed and thus more heat had to be put into the oil in the furnace to maintain the 900° F. reactor temperature since there was less heat of combustion of coke in the regenerator. This change in coke laydown rate is a typical occurrence on commercial units and the operators vary the furnace outlet temperature to take care of such changes. The catalyst circulation rate changes automatically to take care of the heat balance of the regenerator.

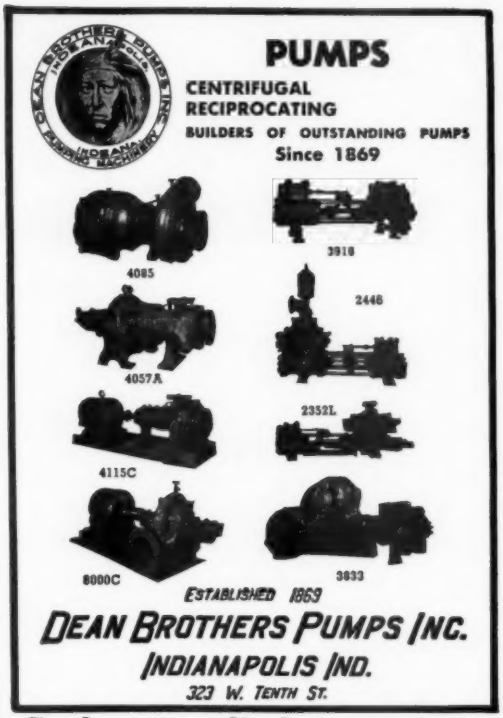
Stripping.—The crystalline nature of natural catalyst allows water or steam to be adsorbed into its structure. Part of the steam in the reactor and stripper is adsorbed by the catalyst and in the regenerator the adsorbed steam is stripped off the catalyst by high temperature and low partial pressure of steam. Due to this hydration, natural catalyst requires more stripping steam than synthetic catalyst. However, the heat released by the adsorption, which amounts to about 1,500 B.t.u. per pound, reduces catalyst circulation requirements because of heat liberation picked up by the catalyst coincident to the adsorption which furnished heat for the reaction in the reactor.

Reactor with catalyst.—Operating variables by which the operator maintains the desired product distribution between debutanized gasoline, iso and unsaturated butanes, and cycle oils are reactor temperature, recycle ratio, space velocity, cat-to-oil ratio, and catalyst activity. It is generally desirable to obtain a conversion or "per cent cracked" from 40 to 75 per cent fresh feed depending on the prevailing economic product distribution. Higher conversion produces more gasoline, less gas-oil product, and more undesirable gas and coke. The conversion limit is usually obtained when the gas and coke increase more rapidly than gasoline production. The reactor is usually held between 900° and 975° F. Fluid units attain catalyst circulation rates so as to have a cat-to-oil ratio on the feed to the reactor of from 10 to 20 lb. of catalyst to 1 lb. of oil. Space velocity or ratio of oil to catalyst in the reactor ranges from 2.0 to 1.0 lb. of oil per hour per pound of catalyst.

Reactor temperature is the most important of these variables. A small change in reactor temperature is sensed throughout the unit by changes in conversion, coke, and gas. The relation between these primary variables to depth of cracking, coke and gas production also depends on the nature of feedstock. Operating correlation of these factors often is difficult on a commercial unit due to the large number of changes constantly taking place.

*Process engineer, Mid-Continent Petroleum Corp. Paper presented at second annual John Zink Process Heating Seminar, Tulsa.





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Fluid Character for Condensate Reservoirs

IN dealing with oil reservoir fluids it is customary to express the phase changes between reservoir and surface conditions by empirical relationships. The familiar curves of formation volume factor versus pressure and solution gas-oil ratio versus pressure are examples. These empirical curves serve in place of complete data on the composition of the reservoir fluids and the equilibrium constants which apply.

Condensate reservoirs have been more commonly dealt with by the determination and use of complete data expressing fluid composition rather than by the use of empirical curves. The latter have their place, however. This discussion will therefore show some of the empirical curves which are used for oil reservoirs extended to cover the condensate-type reservoirs.

Gas solubility, for example, for a natural gas in a crude oil is

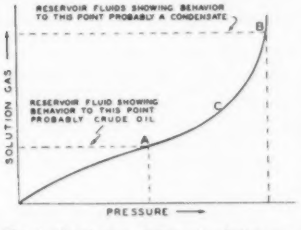


Fig. 1—Typical variation of solution gas-oil ratio versus pressure for a condensate-type reservoir fluid.

commonly expressed as that volume of gas at standard conditions which will dissolve per unit volume of stock-tank oil. This relationship is generally close to linear, particularly at pressures in excess of a few hundred pounds. If the gas being considered were condensable and the condensed gas were miscible with the oil, then as the condensation pressure was reached, the apparent amount of gas which would dissolve would be infinite. Above the condensation pressure the gas is actually a liquid mixing with another liquid.

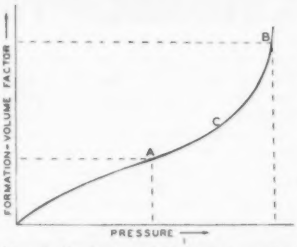


Fig. 2—Typical variation of formation-volume factor versus pressure for a condensate-type reservoir fluid.

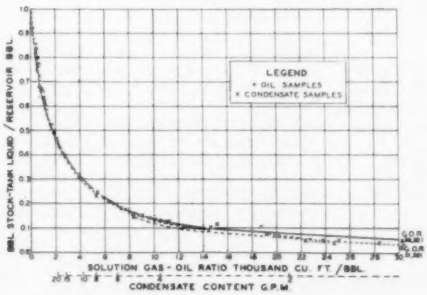
For highly volatile oils and accompanying gases the behavior is of this type. The gases are readily condensable at the reservoir pressures reached. Therefore, the gas solubility measured increases rather suddenly at high pressures, as shown in Fig. 1.

Likewise, the empirical relationship found between formation-volume factor and pressure is linear for crude oil-natural gas systems, but where the amount of solution gas increases rapidly with pressure the formation volume factor also increases rapidly. Considering the behavior as a liquefied gas mixing with another liquid, the formation volume factor could also go to infinity at the liquefaction pressure of the gas. Fig. 2 shows a typical behavior of formation volume factor for a condensate type fluid.[1]

Generally, therefore, reservoir fluids which can be classified as condensate or highly volatile types will have comparatively high gas-oil ratios and formation-volume factors.

Referring to Figs. 1 and 2, one could state with a fair degree of assurance that a reservoir fluid whose curve terminated at A was a typical crude oil and that one whose curve terminated at B was a typical condensate, but the reservoir whose curve terminated at C would not have so definite a status.

The literature[2] gives one correlation showing variation between formation volume factor and solution gas for oil and condensate type reservoirs. This is duplicated here as Fig. 3, where the reciprocal of formation volume factor is plotted versus solution ratio. This relationship is replotted in Fig. 4 as formation-volume factor versus gas-oil ratio, a commoner method of viewing such data. It is apparent that a linear relationship comes very close to expressing this entire range of data and that the variation between these two empirical quantities is the same in the crude-oil region as in the condensate region. The equation of this linear trend is f.v.f. $= 1 + 0.57$ xg.o.r.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× CONDENSATE SAMPLES
BBL. STOCK-TANK LIQUID / RESERVOIR BBL.
SOLUTION GAS - OIL RATIO THOUSAND CU. FT. / BBL.
CONDENSATE CONTENT G.P.M.

Fig. 3—Reservoir volume factor versus gas-oil ratio.

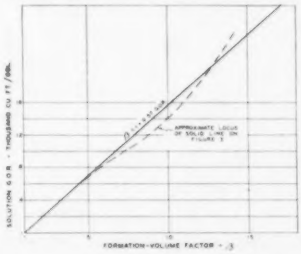

Fig. 4.

References

1. Sloan, The Liquified Gas Reservoir, presented at A.I.M.E. annual petroleum division meeting, Dallas, October 1948.
2. Curtis and Brinkley, Calculation of Natural Condensate Recovery, presented at A.P.I. Division of Production Mid-Continent District spring meeting, Tulsa, March 1949.

Series by Dr. John C. Calhoun, Jr., Chairman, Petroleum Engineering School, Penn State College

CORROSION and its control

Rectifiers for Cathodic Protection

ONE of the most commonly used sources of energy for cathodic protection is commercially purchased power, converted into direct current by means of rectifiers. The apparatus usually referred to as a rectifier is actually two devices in one; a transformer, to convert the purchased power from 110, 220, or occasionally 440 volts to the much lower voltage needed (as low as 2, seldom higher than 30); and the other a set of rectifiers to convert this low-voltage alternating current to direct. Cathodic protection rectifiers may readily be classified in three ways: according to the kind of rectification employed, according to the circuit plan by which the elements are connected, and according to the method of housing and cooling the whole apparatus.

Methods of Rectification

The essential part of a rectifier is a thin film of one kind or another which has the particular property of exhibiting a much lower resistance to the passage of current in one direction than in the other. Two types are of commercial importance: in one a thin film of oxide is formed on a disk or sheet of copper; current will flow from the oxide to the copper more readily than from copper to oxide. In the other a thin layer of selenium is deposited on a steel or aluminum sheet, and covered with a thin layer of conductive metal; current will flow from selenium to the front layer more readily than from the layer to the selenium. For intermittent service, the copper oxide rectifier is to be preferred, since selenium has a tendency to become unstable while out of service. Cathodic protection duty is normally continuous, however, and the slightly higher efficiency of selenium is attractive. Recent shortages in the Chilean copper used in rectifiers have also increased the tendency toward the preference for selenium.

None of the other known methods of rectification — including vacuum tubes, synchronous commutators, motor-generators, and electrolytic types —have found any widespread application in the field of cathodic protection.

Rectifier Circuits

The simplest possible rectifier circuit merely connects a single unit in series with the load and the supply. During the time when the supply voltage is in one direction, current flows; during the remainder of the cycle, it is blocked. This circuit, shown in Fig. 1A, is referred to as a half-wave circuit. If the voltage is too high for a single element, two or more may be connected in series; if the load is too great, two or more elements or groups of elements may be paralleled.

When two elements are required in order to pass enough current, a center tap on the transformer permits them to be connected as shown in Fig. 1 B, in what is known as a full-wave circuit. Current flows in the load during both halves of the cycle, passing alternately through two elements.

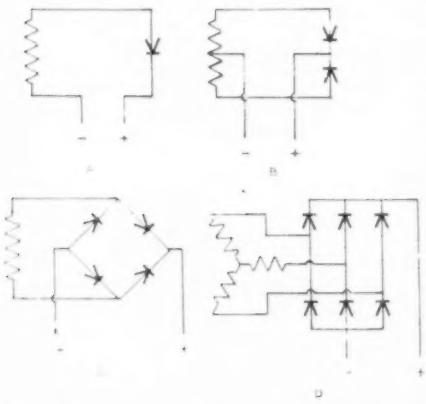

Fig. 1. Four rectifier circuits: (A) single-phase half-wave; (B) single-phase full-wave; (C) single-phase full-wave bridge; and (D) three-phase full-wave bridge.

The primary disadvantage of the half-wave circuit is its low utilization factor, resulting from its intermittent operation; the full-wave circuit requires a mid-tapped transformer, and, if the current output is to be adjusted, two sets of taps in order to supply equal voltages during each half cycle. Both of these drawbacks are overcome in the full-wave bridge circuit shown in Fig. 1 C, which uses four elements (or four groups of elements). This is the circuit almost universally employed in single-phase cathodic protection rectifiers.

Higher efficiency may be obtained by the use of three-phase power; a considerable variety of circuits is possible, only one of which, the three-phase full-wave bridge is shown here, in Fig. 1 D. Three-phase units are more expensive than single-phase in the smaller sizes, although the differential is reduced in large units. In many locations, additional costs are involved in obtaining three-phase power; the savings in operating costs may not be enough to overcome the higher first cost, for one or both of these reasons. The net result is that single-phase rectifiers are used for most cathodic-protection installations, except in the larger sizes and in some particular cases.

Housing and Cooling

Three general arrangements for the necessary cooling are in common use: air cooling by natural circulation, fan cooling, and oil cooling. In the smaller sizes at least, air cooling is the least expensive as to first cost. Bird's nests, insects, and dust are likely to clog up the screens and diminish the effectiveness of the cooling, with resultant loss of efficiency or even burning out. Fan cooling may be less expensive in large units, because of the smaller passages required; it is subject to the same objections, plus the disadvantages of the maintenance required by the fans. Oil-cooled units are higher in first cost, but can be depended on to operate without attention for longer periods of time and under more adverse conditions. Access to the transformer taps is easier in the air and fan-cooled units.

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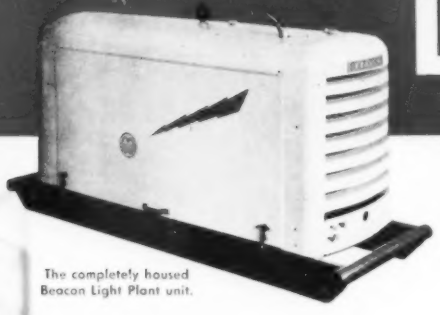
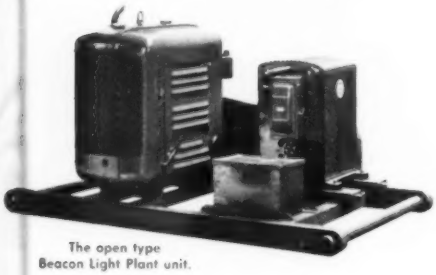
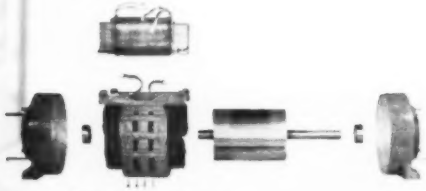


The completely housed Beacon Light Plant unit.



The open type Beacon Light Plant unit.



Only 7 major parts to the Allmand burn-out proof generator.

GENERATOR: The Allmand Brushless Generator, used in the Beacon Light Plant will **not** burn out. This generator operates without brushes, slip-rings, or commutator. The only moving part is a permanent magnet rotor which spins on sealed ball bearings requiring no lubrication. The burn-out proof armature is of all-welded construction and contains no wire. It is wound with $\frac{5}{16}$" solid copper rod capable of carrying three times the rated output of the unit. Available in 3, 5, 7, 10 KW ratings.

ENGINE: All Beacon Light Plants are powered by Continental Red Seal liquid cooled industrial engines. Models available for Diesel, Gasoline or Natural Gas fuel consumption. Units are engineered to run at slow speeds for maximum engine life with ample reserve power to handle heavy overload conditions.

USES: The Beacon Light Plant has been designed to handle all types of industrial lighting and welding requirements. The skillfully designed current control produces a stable, quiet, smooth arc that strikes instantly on all heats. Immediate voltage recovery makes arc easy to strike and maintain.

FLEXIBILITY: Midwestern offers the Beacon Light Plant in both open type and completely housed units. Heavy skid mountings increase portability and give longer life to unit.

✓ **Contrast the simplicity of the Allmand Brushless Generator, at left, with the conventional type generator and its numerous trouble-giving parts.**

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PIPE LINES

Service Lets Contracts For 123-Mile Texas Line

Service Pipe Line Co., Tulsa, has awarded contracts for its new 123-mile, 10-in. pipe line from Haskell County to Bowie, Tex. The line will provide an additional outlet for West-Central Texas oil production.

Smith Contracting Corp., Fort Worth, will build that portion of the line from Service's Jud station in Haskell County, to the west bank of the Salt Fork Brazos River. O. R. Burden Construction Corp., Tulsa and Wichita Falls, Tex., will build the river crossing and the line eastward to Bowie.

When completed next fall, the line will serve new oil development, and will traverse an area where active exploration is under way. The system will connect production in Old Glory, Kiowa Peak, and North Aspermont fields of Stonewall County; South Haskell field of Haskell County; and North Knox City field of Knox County.

The entire Jud-Bowie line will be constructed of reconditioned pipe from other parts of Service's system. Most of the pipe is being taken from the ground in Illinois, Nebraska, Missouri, and Texas. It will be cleaned and reconditioned in yards at Haskell and Henrietta, Tex.

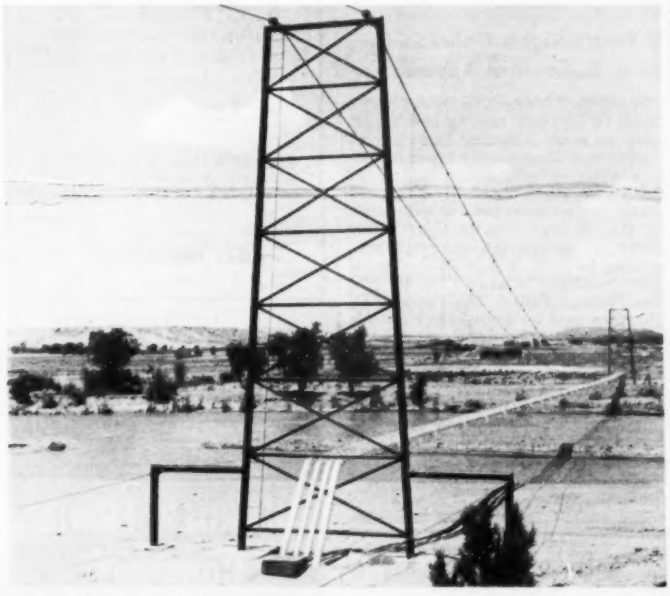
F. M. Willenburg, division manager at Fort Worth, said that recently constructed parallel lines of large diameter were designed with enough capacity to permit removal of loops of smaller-size pipe for reuse elsewhere.

At Bowie the 10-in. line joins Service's north-south trunk system that transports crude oil to refinery centers.

Interstate Expanding Its Southern Division System

SHREVEPORT.—As a result of increasing demand for pipe-line transportation in Coastal Louisiana, Interstate Oil Pipeline Co.'s southern division is launching an expansion program which includes two projects in the Southwest Louisiana (Sunset) district, and one in the South Louisiana (Raceland) district.

One project in Sunset district involves extension of pipe-line facilities to Weeks and Avery Island fields in Vermilion Bay south of New Iberia. A branch line, consisting of 3½ miles of 8-in. and 17 miles of 6-in. pipe will be laid in a "Y"-shaped branch from a junction point on the existing Jeanerette-Sunset trunk line near Jeanerette station. A related project will include 35½ miles of 12-in. pipe, to be laid between Jeanerette and Sunset



RIVER CROSSING.—Overhead natural-gas-transmission crossing of Southern Union Natural Gas Co. over the San Juan River in New Mexico.

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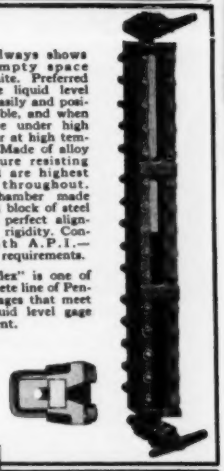

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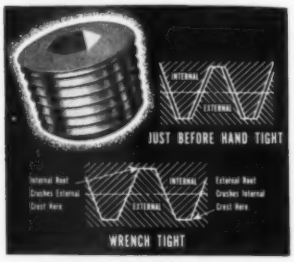

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stations, and two booster stations installed on the Sunset - Anchorage trunk line. One booster station will be located between Sunset and Krotz Springs stations, and the other between Krotz Springs and Anchorage terminal.

The second project is designed to give a substantial increase in the Sunset district's pipe-line capacity into Anchorage terminal. Interstate crews are handling booster-installations, and Houston Contracting Co. has contract for line construction, which got under way July 1.

In the Raceland district, Interstate crews are installing two booster stations on the district's main trunk line along Bayou LaFourche. One station is going in between Raceland and Belle Rose stations, and the second is being installed between Belle Rose and Anchorage terminal.

Additional line capacity obtained is expected to eliminate present barge shipments now being made out of Valentine station.

Gulf to Build 43-Mile 6-In. Line to Serve Spraberry

HOUSTON.—Gulf Refining Co. and Gulf Oil Corp. have announced plans to construct a new 43-mile, 6-in. crude-oil line to serve the Spraberry oil-producing areas of Upton, Glasscock, Reagan, and Midland counties, Texas.

The line will originate in the northeast portion of Upton County, and will connect with Gulf's main pipeline system at Midland, Tex.

El Paso's Rights Upheld By U. S. Court of Appeals

WASHINGTON.—The United States Court of Appeals has refused to set aside an order directing Secretary of the Interior Chapman to grant rights-of-way across federal land in Arizona to El Paso Natural Gas Co.

The order was issued last week by the Federal District Court after Chapman denied the company permission to build a pipe line crossing 16 miles of public lands *(The Oil and Gas Journal, July 5, 1951, page 103)*. Chapman said he denied the right-of-way because the company would not agree to enlarge its facilities in the future to handle gas which might be offered by other companies.

El Paso contended that such a requirement was outside Chapman's jurisdiction, and said other rights-of-way had been obtained earlier in its construction program without such a stipulation.

The court's rejection of the Interior secretary's appeal clears the way for El Paso to continue its construction. Attorneys estimated that it would take at least 7 weeks to complete the remaining 32 miles of construction.

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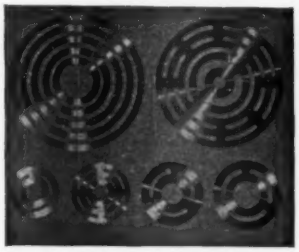

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Pipe-Line Construction

FOLLOWING is a tabulation of pipeline projects which are planned or under construction. Included are crude-oil, products, and natural-gas lines. The list was compiled from surveys made by The Oil and Gas Journal.

Crude-Oil Pipe Lines

Alberta-Vancouver Oil Pipe Line Co. (Brokaw, Dixon, McKee).—972 miles, 16-in., proposed, Edmonton via Pincher Creek, Alta., Idaho and Washington states to Vancouver, B. C.

Derby Oil Co.—15 miles, 6-in., authorized, Wichita to Bentley, Kans. Completion date 1-1-52.

Gulf Refining Co.—64 miles, 10-in., authorized, Eucutta to Lumberton. Completion date 1-1-52.

Gulf Refining Co.—87 miles, 14-in., authorized, Lumberton to Mobile. Completion date 1-1-51.

Interstate Oil Pipe Line Co.—35½ miles, 12-in., under way, New Iberia to Sunset, La. Houston Contracting Co.

Interstate Oil Pipe Line Co.—20 miles, 6-8-in., under way, New Iberia to Weeks Island and Avery Island fields. Houston Contracting Co.

Ohio Oil Co.—117 miles, 22-in., authorized, Sheridan, Ind., to Lima, Ohio.

Phillips Pipe Line Co.—27 miles 8-in., looping from Borger, Tex., to Yale, Okla.

Phillips Pipe Line Co.—Authorized, Midland, Glasscock, Reagan, and Upton counties.

Platte Pipe Line Co.—1,075 miles, 16-20-in., under way, Worland, Wyo., to Wood River, Ill.

Platte Pipe Line Co.—573 miles, 16-20-in., under way, Worland, Wyo., to Holdredge, Neb. R. H. Fulton & Co. (Sections 1, 2, 3, and 4.—Section 1, 126 mi. of 16-in., remainder 20-in.). A. A. Carrigan, spreadman at Casper, Wyo., field office.

Platte Pipe Line Co.—142 miles, 20-in., under way, near Marysville, Kans., to Holdredge, Neb. Bishop & Lock (Section 5); H. LaQuey, spreadman.

Platte Pipe Line Co.—100 miles, 20-in., under way, northern edge of Kansas. Rumsey Bros., contractor of Section 6.

Platte Pipe Line Co.—(Section 7) 274 miles, 20-in., under way, Missouri River to Salisbury; field office, Carrollton, Mo.; O. P. Hiner, spreadman. (Section 8) Salisbury to Mississippi River; field office, Moberly, Mo.; B. C. Hall, spreadman. O. R. Burden, contractor. Completion date 9-51.

Progress Co.—900 miles, 20-in., proposed. Permian basin, West Texas to California.

Service Pipe Line Co.—130 miles, 8-10-in., planned, Old Glory field to Bowie, Tex.

Service Pipe Line Co.—57 miles, 10-in., under way, West Bank Salt Fork Brazos River to Jud Station, Haskell County, Texas. Completion date 9-15.

Service Pipe Line Co.—65 miles, 10-in. under way, West Bank Salt Fork Brazos River to Bowie Station, Montague County, Texas. Completion date 9-15.

Sinclair Pipe Line Co.—674 miles, 22-in., authorized; Drumright, Okla., to E. Chicago, Ind.

Texas-New Mexico Pipe Line Co.—75 miles, 8-in., planned, Midland to Germania pool; Midland to Scarborough and Sweetie Peck area; and Crane station to McElroy area, West Texas.

Texas-New Mexico Pipe Line Co.—55 miles, 8-in., planned, Eunice to Covington and Saunders area, New Mexico.

Trans-Mountain Oil Pipeline Co. (Sponsored by Bechtel Corp.)—715 miles, under way by July 1951, Edmonton, Alta., via Yellowhead Pass to Vancouver, B. C.

West Texas Gulf Pipe Line Co.—467 miles, 26-in., authorized, Colorado City to Wortham, Tex., 26-in.; Wortham to Sour Lake, Tex., 24-in. Completion date 10-52.

West Texas Gulf Pipe Line Co.—114 miles, 20-in., authorized, Wortham to Longview, Tex. Completion date 10-52.

Products Pipe Lines

Bell Oil & Gas Co.—150 miles, 6-in., planned, Ardmore to Drumright, Okla.

Buckeye Pipe Line Co.—430 miles, 14-in., proposed, Linden, N. J., to Allentown, Pa., Junction; Chelsea, Pa., via Allentown Junction to Auburn, Rochester, Syracuse and Oswego, N. Y. Start 1952; finish 1953.

Ohio Oil Co.—24 miles, 8-in., authorized, East St. Louis to Wood River, Ill.

Phillips Petroleum Co.—163 miles, 12-in., looping from Borger, Tex., to Paola, Kans. Completion date 11-1-51.

Phillips Petroleum Co.—137 miles, 10-in., looping from Paola, Kans., to East St. Louis, Ill. Completion date 11-1-51.

Phillips Petroleum Co.—198 miles, 8-in., looping from East St. Louis, Ill., to East Chicago, Ind. Completion date 11-1-51.

Plantation Pipe Line Co.—707 miles, 14 and 18-in., under way, Baton Rouge to Charlotte, N. C., 275 miles, 14-in., under way, Bremen to Charlotte, N. C.; 432 miles, 18-in., under way, Baton Rouge to Bremen, Ga.; 220 miles, 18-in., Baton Rouge to Mississippi-Alabama state line; Williams Brothers Co. David R. Williams, Jr., project manager.

Plantation Pipe Line Co.—126 miles, 18-in., under way, Collins, Miss., to Baton Rouge, La. Williams Bros., contractor. O. R. Mitchell, spreadman, at Prestiss, Miss. Completion date 8-31-51.

Plantation Pipe Line Co.—150 miles, 18-in., under way, Moundville, Ala., to Collins, Miss. Williams Bros., contractor. A. T. Maxwell, spreadman, Meridian, Miss., Completion date 8-31-51.

Plantation Pipe Line Co.—200 miles, 14-in., under way, Winder, Ga., to Charlotte, N. C. Williams Bros., contractor. T. E. Davis, spreadman at Athens, Go. Completion date 10-1-51.

Progress Co.—900 miles, 10-in., proposed, California to West Texas.

Salt Lake Pipe Line Co.—Proposed, Pasco, Wash., to Puget Sound.

Standard Oil Co. (Ind.).—144 miles, 8-in., under way by early fall, Neodesha, Kans., to Sugar Creek, Mo.

Triangle Pipe Line Co.—100 miles, 10-in under way, Eldorado, Ark., to point on Mississippi River. Anderson Bros. Corp.

Tuscarora Oil Co., Ltd.—61 miles, 10-in., authorized, Knappenberger to Midland, Pa.

Tuscarora Oil Co., Ltd.—25 miles, 10-in., under way, Indiana, Pa.

Natural-Gas Pipe Lines

Algonquin Gas Transmission Co.—276 miles, proposed, Greenwich, Conn., to Boston area; 492 miles, proposed, laterals-New England area.

Amere Gas Utilities Co.—11 miles, 8-in., authorized KA-8 loop, Priceton and Athens, W. Va. Completion date December 1951.

Associated Natural Gas Co.—68 miles, planned, Missouri.

Carolina Natural Gas Corp.—185 miles, 2-12-in., proposed, lateral lines off Transcontinental in North and South Carolina.

Central Kentucky Natural Gas Co.—13 miles, 20-in., line E loop, Means to Foster, Ky. Completion date October 1951.

Central Kentucky Natural Gas Co.—15 miles, 20-in., Cold Spring, Ky., to Anderson's Ferry, Ohio. Completion date December 1951.

Cities of Booneville and Baldwin, Miss.—98 miles, ¾ and 6-in., under way, Booneville and Baldwin, Miss.; M. L. Hulcher Co., Inc., contractor, Sam Carnahan, spreadman. Completion date November 1, 1951.

Cities Service Gas Co.—179 miles, 4-30-in., gathering system in vicinity of Ulysses,

Miles and Miles of PIPELINE!

Pioneering PIPELINERS Since 1915

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CONTRACTING CO.
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Efficient, trouble-free pumps MUST be used on the important oil country service of circulating hot water for an indirect emulsion heater. Temperatures of the treating tank must be kept uniform by a constant hot water flow. That's where Marlows come in.

The two Marlow Model 34EB Self-Priming Centrifugal pumps above are used by Continental Oil Company at Ville Platte, Louisiana, to handle this critical operation. It is one of four such crude oil emulsion heater systems on Continental leases in the Ville Platte area — AND MARLOW PUMPS ARE USED ON THEM ALL.

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544 GREENWOOD AVENUE
RIDGEWOOD, NEW JERSEY
Engineers and Representatives Everywhere

Kans. Vaughn & Taylor Const. Co., Inc. D. D. Vaughn, spreadman, Ulysses.

Cities Service Gas Co.—86 miles, 6-7-8-10 in., under way, takeup Hutchinson to Wichita, Kans.; Knupp Const. Co.; Newton Kans., field office, Cliff Harris, spreadman

City of Alabama.—120 miles, 2 to 8-in., under way, Alabama; Modern Welding Co Inc., contractor, D. D. Foreman, spreadmar Completion date 9-51.

Coast Counties Gas & Electric Co.—4 miles, 3, 4, and 8-in., planned, Coast an Valley region, California.

Colorado Interstate Gas Co.—215 mile 20-in., planned, Texas Panhandle to Col rade.

Commonwealth Natural Gas Corp. — 5 miles, 20-in., proposed, West Bend, Ky., Norfolk, Va.

Dow Chemical Co. — 70 miles, various sizes, Midland, Saginaw, and Bay City, Mich.; Mahoney Contracting Co., contractor, Ralph Bucher, spreadman at Midland.

East Ohio Gas Co.—65 miles, 26-in., under way, near Petersburg to Cleveland, Ohio. Williams Bros., contractor. Completion date 12-1-51.

East Tennessee Natural Gas Co.—172 miles 22-in., proposed, Greenbrier to Oak Ridge Tenn.

Egyptian Natural Gas Co.—80 miles, 6-i in., authorized, Norris City to Salem-Cer tralia, Ill., area.

El Paso Natural Gas Co.—123.9 miles, 30 in., proposed, looping along main line i Texas, New Mexico, Arizona.

El Paso Natural Gas Co.—470 miles, 24-in under way, San Juan basin, New Mexic to Franconia, Ariz. Completion date 10-1-51.

Grand Valley Pipe Line Co.—105 miles 8-10-in., planned, Piceance Creek field t Rifle on to Grand Junction, Colo.

Gulf Michigan Transmission Corp. — 68 miles, 30-in., proposed, Perryville, La across Arkansas, Missouri, and Illinois t terminus near St. John, Ind.

Hope Natural Gas Co.—32 miles, 8⅝-in., under way, Terra Alta field to Fairmont, W. Va. Pipe Line Const. & Drilling Co.

Hugoton Production Co.—40 miles, 30 t 4-in., under way, near Ulysses, Kans., gath ering system. Reese Bros. Const. Co., con tractor. Hugoton, Kans., field office, Pau G. Reese, spreadman.

Illinois Gas Co.—15 miles, 4-in., under way, Lawrenceville, Ill. L. R. Young Const Co., contractor. Completion date 8-1-51.

Kansas-Nebraska Natural Gas Co.—65 miles, 2-8-in., planned, Big Springs field to Ogallala, Neb., and to Ovid, Colo.

Kansas-Nebraska Natural Gas Co., Inc.—39 miles, 4 and 6-in., planned, Neligh to O'Neill, Neb., 54 miles, 4 and 6-in. planned, Neligh to Hartington, Neb. (extension) Completion date 1952.

Kansas Power & Light Co.—10 miles, 8-in., authorized, parallel 6-in., north from Larned, Kans.

Kansas Power & Light Co.—27 miles, 20-in., authorized, Pratt, Kans., to Calista compressor station.

Kansas Power & Light Co.—9 miles, 16-in., authorized, parallel 16-in., northeast of McPherson, Kans.

Manufacturers Light & Heat Co.—78 miles, 16-in., contracted, Berwindale, Pa., to near Saltsburg, Pa. Britton Construction Co., contractors.

Manufacturers Light & Heat Co.—35 miles, 16-in., under way, Berwindale to Clearfield County, Pennsylvania. Britton Construction Co., contractor, L. A. Stewart, spreadman at Philipsburg, Pa. Completion date 8-1-51.

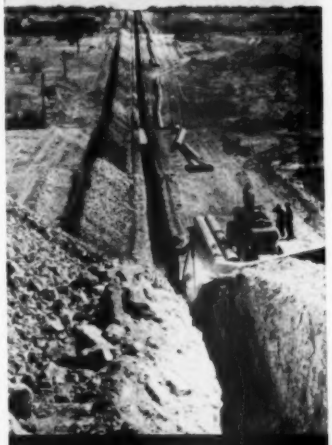
Manufacturers Light & Heat Co.—31 miles, 16-in., under way, East Bank of Moshannon Creek to Trans-Penn Transit line near Hynder, Pa. Britton Construction Co., contractors, Fred McKenzie, spreadman at Renovo, Pa. Completion date 8-1-51.

Michigan Consolidated Gas Co.—31 miles, 24-in., under way, Austin Storage fields to Lincoln Storage field, Michigan. Anderson Bros. Corp., contractor. Completion date 8-15-51.

Michigan Consolidated Gas Co.—131 miles, 24-in., under way, Austin Storage fields to Detroit. Anderson Bros. Corp., contractor. Completion date 11-1-51.

Michigan Consolidated Gas Co.—180 miles 24-in., planned, Austin, Mich., to Detroit.

Getting rock out of ditch for a 22" pipeline in the Southwest.



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Mississippi River Fuel Corp.—98 miles, 16 and 18-in., proposed, feeder line from Lincoln Parish, La., to Waskom field, Harrison County, Texas.

Mississippi River Fuel Corp.—40 miles, 18-in., authorized, Dubach to Perryville, La.

Missouri Central Gas Co.—30 miles, 6-in., under way, Moberly to Macon, Mo. L. R. Young Const. Co., contractor. Completion date 8-1-51.

National Utilities Co. of Michigan.—76.7 miles, 20-in., proposed, South Central Michigan. (23 miles from near Marshall south to Coldwater; 20 miles east to Hillsdale; 22 miles southwest to Sturgis; 5 miles from Hillsdale to Jonesville and 6 miles west to Union City.)

Nevada Natural Gas Pipe Line Co.—114 miles, proposed, Topock, Ariz., to Las Vegas, Nev.

New River Gas Co.—50 miles, planned. Summers or Monroe counties, W. Va., to Narrows and Dublin, W. Va.

New York State Natural Gas Corp.—39 miles, 20-in., authorized, Potter County, Pennsylvania, to Livingston and Monroe counties, New York.

New York State Natural Gas Corp.—26 miles, 20-in., authorized, New Kensington to South Bend, Pa.

New York State Natural Gas Corp.—51 miles, 20-in., authorized, New Kensington, Pa., to Ohio line.

New York State Natural Gas Corp.—27 miles, 16-in. authorized, looping in Greene and Westmoreland counties.

New York State Natural Gas Corp.—70 miles, 20-in., planned, North Oakford, Pa., to Ohio state line.

New York State Natural Gas Corp.—62 miles, 20-in., under way, Murrysville, Pa., to Petersburg, Ohio; 37 miles, 20-in., under way, Boome storage field to Ithaca, N. Y. Field office, Lawrenceville, Pa. Completion date October 1951; 23 miles, 20-in., contracted, state line station to Angelica, N. Y. Office, Wellsville, N. Y. Completion date October 1951; 82½ miles, 20-in., under way, Utica to Ithaca, N. Y. Field office, Clinton, N. Y., Leman Creech, supt.; completion date 11-15-51; 85 miles, 16-in., under way by September, Utica to Albany, N. Y.; Williams-Austin Co., contractor, Ed Peters, over-all general supt.

New York State Natural Gas Co.—77 miles, 20-in., under way, Indiana Pa., to Petersburg, Ohio. Williams Bros., contractor. Clyde Gregory, spreadman at Leechburg, Pa. Completion date 10-31-51.

New York State Natural Gas Co.—65 miles, 26-in., authorized, Ohio-Pennsylvania state line northwesterly to Summit County, Ohio.

Niagara Mohawk Power Corp.—40 miles, 10-12-16-in., under way, lateral lines at Utica, N. Y.; 55 miles, 10-in., Fulton to Watertown, N. Y.; Williams-Austin Co., contractor, Howard Bauer, supt.

Northeastern Gas Transmission Co.—511 miles 20-24-in., authorized, New Hampshire, Massachusetts, and Connecticut.

Northeastern Gas Co.—411 miles, proposed, New England towns.

Northern Natural Gas Co.—580 miles, proposed, Kansas, Texas, Oklahoma, and Nebraska loops.

Northern Natural Gas Co.—370 miles 4-26-in., authorized, gathering lines in Hugoton field.

Northern Natural Gas Co.—217 miles, 26-in., under way, Palmyra, Neb., to Skellyville, Tex. G. G. Griffis Const. Co., contractor; field office, Beatrice, Neb.; G. L. Mims, superintendent; E. G. Grisham, spreadman.

Northern Natural Gas Co.—210 miles, 26-in., proposed, five loops in Texas-Oklahoma area, two in Kansas, and two in Nebraska.

Northern Natural Gas Co.—181 miles, 4-12-in., contracted, gathering system in Hugoton area. Reese Bros. Const., contractor.

Northern Indiana Fuel & Light Co.—33 miles, 8-in., proposed, Edgerton to Auburn, Ind.

Northwest Natural Gas Co.—750 miles, planned, Washington, Oregon, and Idaho.

Ohio Fuel Gas Co.—22 miles, 16-in. authorized, Dayton, Troy, Piqua, and Sidney, Ohio.

Ohio Fuel Gas Co.—74 miles, 3 to 20-in., authorized, Hocking, Knox, and Ashland counties, Ohio.

Ohio Fuel Gas Co.—47 miles, 20-in., authorized, Benton Township, Hocking County, to Columbus, Ohio.

Ohio Fuel Gas Co.—61 miles, proposed, northern and southwestern Ohio.

Oklahoma Natural Gas Co.—40 miles, 16-in., under way, Ninnekah, Okla., to County Line, Okla.; Trojan Construction Co., contractor.

Oklahoma Natural Gas Co.—26 miles, 12-in., authorized, Ringwood to Enid, Okla. Completion date January 1952.

Oklahoma Natural Gas Co.—40 miles, 2-36-in., authorized, Ringwood field gathering system. Completion date January 1952.

Pacific Gas & Electric Co.—44 miles, 8-in., under way, Salinas to King City, Calif.

Pacific Gas and Electric Co.—141 miles, 34-in., proposed, parallel sections along Topock-Milpitas line.

Pacific Northwest Pipe Line Co.—400 miles, 22-in., gathering lines on Texas Gulf Coast to Pacific Northwest pipe line.

Pacific Northwest Gas Pipe Line Corp.—2,175 miles, planned, Wharton County, Texas, via Oklahoma, Kansas, Fort Collins, Colo., to Portland, Ore., Tacoma and Seattle, Wash.

Panhandle Eastern Pipe Line Co.—174 miles, 30 and 26-in., contracted, Tuscola, Ill., eastward—looping present system; R. A Conyes, contractor. 44 miles, 26-in., Edgerton, Mich.; Anderson Bros.: 22 miles, 30-in., looping in Tuscola, Ill.; 45 miles, 30-in., looping in Montezuma, Ind.; 63 miles, 30-in., looping in Zionsville, Ind.

Pennsylvania Gas Co.—52 miles, 12-in., between Warren and Erie, Pa. (Sect. 1—27 miles, under way and contracted by Harford Bros. Sect. 2—25 miles.

Phillips Petroleum Co.—118 miles, 3-22-in., under way, Sherman and Hansford counties, Texas gas-gathering system; Vaughn & Taylor Construction Co., Inc., Dumas, Tex., J. F. Crawford, spreadman at Texhoma, Okla.

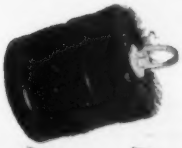
THE PIG WITH THE POKE — CLEANS PIPE LINES

— THE VERY LATEST —

Williamson Pipe Line Pigs*

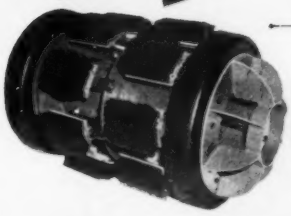
FOR CLEANING

Natural Gas Pipe Lines

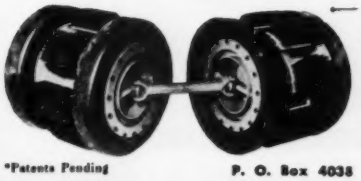


4" Size—TYPE JRN—2" to 4" sizes. Will pass 1½R-90° Bends. No valves other than full diameter thru-port valves. Use TYPE SCN-51 for 6" Size.

8" Size — TYPE WC-11 — 8" to 14". Will traverse 6 foot radius field bends, full diameter side openings at 45°. SPRINGS COMPENSATE for BRUSH WEAR.



20" Size—TYPE GP-2—16" to 30". 200-LB. SPRING Forces the Brushes against pipe wall —COMPENSATING for WEAR. Will traverse round-opening gate valves. SPRINGS and BRUSHES are identical and interchangeable for all types and sizes of GP PIGS.



24" Size — GP-3 — 18" to 30" Sizes will pass 1½R-90° Bends. SPRINGS COMPENSATE for BRUSH WEAR, ASSURING Full section cleaning efficiency. GP-3 consists of two Type GP-1 Pigs. — Each Unit may be used as individual pig.

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TAPECOAT — the distinctive, time-tested coal tar tape for spiral-wrapping welded field joints, service connections, pipe under streets and sidewalks, and pipe through building walls.

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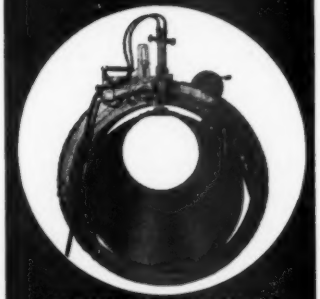
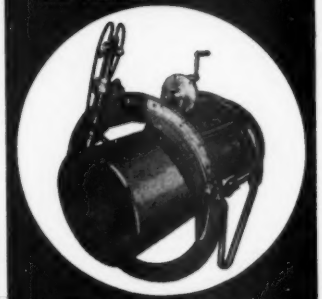


EQUIPPED WITH OUT-OF-ROUND ATTACHMENT

Machines to cut and bevel 16" pipe and over are furnished with out-of-round attachment.



EQUIPPED WITH STANDARD TORCH HOLDER

Machines to cut and bevel 14" pipe and under are furnished with Standard Torch Holder.

Crose pipe cutting and beveling machines are sturdy light weight construction made from cast aluminum. Simple operation. This machine has a split ring which enables it to be installed over the pipe for cut outs. The out-of-round cutting attachment allows you to cut true bevels on bent or egged pipe. Machines to cut and bevel pipe up to and including 36 inches in diameter are available for immediate delivery.

WRITE FOR BULLETIN BM1001

M. J. CROSE MANUFACTURING CO., INC.

2715 Dawson Rd. Tulsa, Okla.

M & M Building Houston, Tex.

Piedmont Natural Gas Co.—38 miles, 6-in., proposed, North Carolina—laterals from Transcontinental gas system.

Prince George's Gas Corp.—30 miles, 22-in., authorized, between Chillum and Rockville, Md.

Southern California Gas Co.—22 miles, 22-in., under way, Simi to Santa Clara River, Calif. Joe E. Young Pipeline Const. Co., contractor. Completion date 9-51.

Southern California Gas Co.—24 miles, 30-in., under way, Inglewood to San Ferdando Valley, California. Alex Robertson Co., contractor. Completion date 11-51.

Southern Natural Gas Co.—21 miles, 24-in., authorized, Perryville Station, La., to Boeuf River.

Southern Natural Gas Co.—14 miles, 24-in., authorized, Onward Station, Miss., to Big Sunflower River.

Southern Natural Gas Co.—14 miles, 14-in., authorized, Perryville Station, La., to Wilhite Gate.

Southern Natural Gas Co.—375 miles, 24-in., planned, Gwinville, Miss., to Atlanta, Ga.

Southern Natural Gas Co.—169 miles, proposed loops, Ouachita Parish, Louisiana, to Augusta, Ga.; 30 miles in Ouachita Parish; 33 miles in Ouachita and West Carroll parishes; 7 miles, Sharkey County, Mississippi; and 106 miles, 14-in., Bass Junction to Augusta, Ga.

Southwest Gas Corp., Ltd.—26 miles, proposed, from P. G. & E. line to Victorville, Calif.

Sunray Oil Corp.—133 miles, 3-30-in., under way, system for Snyder gasoline plant, Vaughan & Taylor Construction Co., contractor. D. D. Vaughn, spreadman.

Sunray Oil Corp.—8-in., under way, Allen to Drumright, Okla. Refinery Engineering Co., contractor. Completion date 9-51.

Tennessee Gas Transmission Co.—902 miles, 30-in., planned, first 150 miles of loops to be laid at Monroe, La., Greenville, Miss., Midland and Portland, Tenn.

Tennessee Gas Transmission Co.—438 miles, planned, looping on Buffalo and New England extensions.

Tennessee Gas Transmission Co. and Northeastern Gas Transmission Co.—175 miles, 24-in., under way, Albany, N. Y., near Wilmington (Boston area), Mass. Oklahoma Contracting Co., contractor, Springfield, Mass., headquarters, Paul R. Halbert, manager, H. A. Wylie, spreadman at Pittsfield, Mass., Aldress Kilgore, spreadman at Westfield, Mass. L. B. Rea, spreadman.

Tennessee Gas Transmission Co.—304 miles, 24-in., proposed, between Mercer, Pa., and Utica, N. Y.; 538 miles, proposed, loops; 360 miles, proposed, miscellaneous lateral lines.

Tennessee Gas Transmission Co.—188 miles, 30-in., under way, vicinity of Jones, La., on the north to near Cypress, Tex., on the south; Houston Contracting Co. Four spreads located as follows: North end work at Bastrop, Tex., W. H. Hayes and M. L. Thompson, superintendents; center section at Natchitoches, La., E. C. Norris and R. E. Thornton, superintendents; south end at Conroe, Tex., F. A. Silar, superintendent.

Tennessee Gas Transmission Co.—64 miles, 26 and 30-in., loops, contracted, South Texas. Oklahoma Contracting Co., contractor, field office, Falfurrias, Tex., Panama Shiflett, superintendent.

Tennessee Gas Transmission Co.—156 miles 24-in., under way, Hamburg to Onondaga-Madison County line, N. Y.; H. C. Price; Auburn and Warsaw, N. Y., field offices, G. A. Reutzel and R. K. Shivel, spreadmen.

Tennessee Gas Transmission Co.—120 miles, 24-in., under way, Hamburg to Hudson River; Bechtel Constructors, Inc.; Richfield Springs, N. Y., project office, R. L. Bowman and W. N. Molander, superintendents.

Tennessee Gas Transmission Corp.—419 miles, 26-30-in., authorized, loop line along presently authorized system.

Texas Eastern Transmission Corp.—791 miles, 30-in., planned, Kosciusko, Miss., to Connellsville, Pa.

Texas Eastern Transmission Corp.—36 miles, 20-in., under way, Connellsville, Pa., to Oakland Storage area; Mahoney Contracting Co.; Henry Mogg, superintendent. Completion date 8-1-51.

Texas Eastern Transmission Corp.—163 miles, 30-in., under way, Kosciusko, Miss., to Florence, Ala.; Williams Bros.-Davis Co.; Kosciusko, Miss., field office, G. R. Hamilton, spreadman. Completion date 10-15-51.

Texas Eastern Transmission Corp.—100 miles, 30-in., contracted, Kentucky River to Ohio River in northeastern Kentucky. Mahoney Const. Co., contractor. Henry Mogg, spreadman. Completion date 10-15-51.

Texas Eastern Transmission Corp.—76 miles, contracted, Tennessee River to Columbia River. Eastern Pipe Line Contractors. Completion date 10-1-51.

Texas Eastern Transmission Corp.—73 miles, contracted, Columbia, Tenn., to Cumberland River. H. B. Zachry Co. A. Vaughn, spreadman at Columbia, Tenn. completion date 10-15-51.

Texas Gas Transmission Corp.—35 miles, 12-in., authorized, Slaughters, Ky., to Evansville, Ind.

Texas Gas Transmission Corp.—189 miles, 26-in., proposed, Acadia Parish to connection with existing facilities in Morehouse Parish.

Texas Gas Transmission Corp.—195 miles, 26-in., proposed, Gulf Coast region to southwestern Louisiana.

Texas Gas Transmission Corp.—325 miles, 26-in., proposed, looping from Bastrop, La., to Hardinsburg, Ky.

Texas Gas Transmission Corp.—300 miles, 26-in., proposed, Louisiana and Kentucky

Texas-Illinois Natural Gas Pipeline Co.—1,300 miles 30-in., under way, Corpus Christi area to Joliet, Ill.

Texas Illinois Natural Gas Pipe Line Corp. 58 miles, 20-in., under way, Joliet, Ill., to Volo Meter Station, Ray L. Smith & Son, Inc., contractor; field office, Aurora, Ill.; R. M. Jones, spreadman.

Texas-Illinois Natural Gas Pipeline Co.—100 miles, 30-in., under way, Mississippi River to Effingham, Ill.; Midwestern Constructors, Inc., contractor of Schedule 11 M. T. Wilhite, superintendent; field office, Du Quoin, Ill. completion date 10-15-51.

Texas-Illinois Natural Gas Pipeline Co.—100 miles, 30-in., under way, Effingham to Sibley, Ill., Midwestern Constructors, Inc.,

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SCHIELD "BANTAM" CRANES

contractor of Schedule 12. Monticello, Ill., field office, Cliff Simmons, superintendent. Completion date 9-17-51.

Texas-Illinois Natural Gas Pipeline Co.—92 miles, 30-in., under way, Sibley to Joliet Ill.; Midwestern Constructors, Inc., contractor of Schedule 13. Morris, Ill., field office, Denver Franklin, superintendent. Completion date 9-4-51.

Texas-Illinois Gas Pipe Line Corp.—40 miles, 30-in., contracted, Arkansas and Missouri; Bechtel Corp. V. L. Williams, supt. at Little Rock, Ark.

Texas Illinois Natural Gas Pipe Line Co.—98 miles, 30-in., under way, Urbana to Garrison, Tex. H. C. Price, contractor. Completion date 8-29-51.

Texas Illinois Natural Gas Pipe Line Co.—96 miles, 30-in., under way, Garrison, Tex., to Texas-Arkansas state line. H. C. Price, contractor. Completion date 9-18-51.

Texas Illinois Natural Gas Pipe Line Co.—106 miles, 30-in., under way, Texas-Arkansas state line to Malvern, Ark. Bechtel Corp., contractor. Completion date 10-15-51.

Texas Illinois Natural Gas Pipe Line Co.—130 miles, 30-in., under way, Malvern to Newport, Ark. Bechtel Corp. Completion date 10-15-51.

Texas Illinois Natural Gas Pipe Line Co.—74 miles, 30-in., under way, Newport to Moark, Ark. Bechtel Corp., contractor. Completion date 10-15-51.

Texas-Illinois Gas Pipe Line Corp.—20 miles, 30-in., under way; Trinity River to Texarkana; H. C. Price, contractor. C. E. Shivel, spreadman at Carthage; C. R. Ice, spreadman at Nacogdoches.

Transcontinental Gas Pipe Line Corp.—5 miles, 24-in., authorized, Paterson lateral to Greenwich, Conn.

Trunkline Gas Co.—1,775 miles, 16-26-in., under way, includes 740-mile, 26-in. Lake Charles, La., to Tuscola Station of Panhandle Eastern Pipe Line Co., and 1,035 miles, 10-24-in., Lake Charles, La., to McAllen, Tex., completion due October 1952.

Trunkline Gas Co.—50 miles, 26-in., contracted, Longville to northeast vicinity of Hineston, La.; 126 miles, 26-in., contracted Epps to Hineston, La.; 42 miles, 16-20-in., under way, Lake Arthur, Longville to point north of Iowa, La., (Section 1, lateral line); 33 miles, 20-in., under way, Lake Arthur, La., to Lacassine, La.; Houston Contracting Co., contractor.

Trunkline Gas Co.—176 miles, 26-in., under way, Darnell, La., to Longville, La.; Houston Contracting Co., contractor of Section A, main line. E. C. Norris, Olla, La., spreadman. W. H. Hayes, spreadman, De Ridder, La.

Trunkline Gas Co.—180 miles, 26-in., contracted, Darnell, La., to Senatobia, Miss.; Anderson Bros. Corp., contractor, Section B, main line.

Trunkline Gas Co.—184 miles, 26-in., under way, Senatobia, Miss. to Paducah, Ky.; R. H. Fulton & Co., contractor of Section C, main line. Clark Williams, Memphis, Tenn., spreadman.

Trunkline Gas Co.—262 miles, 20-in., contracted, McAllen to Altair, Tex.; R. H. Fulton & Co., contractor of Section E and F, lateral lines.

Trunkline Gas Co.—217 miles, 24-in., contracted, Longville, La., to Altair, Tex.; Anderson Bros. Corp., contractor of Sections G and H, lateral line.

Trunkline Gas Co.—184 miles, 26-in., under way, Senatobia, Miss., to Joppa, Ill. R. H. Fulton & Co., contractor, Clark Williams spreadman, Union City, Tenn.

Union Gas & Electric Co.—35 miles, 8-in., Bloomington to Harris, Ill. O. R. Burden, contractor. Floyd Lewis, spreadman at Bloomington, Ill., Fall completion date.

United Fuel Gas Co.—29 miles, 20-in., authorized, Lanham to Broad Run, W. Va.

United Gas Pipe Line Co.—90 miles, 8-10-12-16-in., under way, Chalmette to Venice and West Bay Field, La. Brown & Root, Inc., contractor, J. W. Kincy, spreadman at Harvey, La. Completion date 9-51.

United Gas Pipe Line Co.—50 miles, 16-in., authorized, Baldwin County, Alabama, southeasterly to Escambia County, Florida.

United Gas Pipe Line Co.—100 miles, 20-24-26-in., contracted, Near Houma to Franklin, La.; Associated Pipe Line Contractors, Inc.

United Gas Pipe Line Corp.—510 miles, 14-26-30-in., contracted, Agua Dulce, Tex., to Monroe, La.; 233 miles, 20-24-26-30-in., from Pure Oil Co.'s offshore platform Block 32 Eugene Island area to Jackson, Miss., comp. sta.; 60 miles, 12-16-20-in., from Lafayette comp. sta. and Weeks Island field to Franklin, La., to connect with above mentioned 30-in.; 59 miles, 30-in., Jackson comp. sta., Miss., to Texas Eastern Trans. Corp.; 124 miles, Sterlington comp. sta. near Monroe, La., to Jackson comp. sta., Miss.; 23 miles, 8-12-16-in., South Louisiana facilities; all contracted by Gulf Southern Contractors, a joint venture including Texas Louisiana Contractors; Oklahoma Contracting Co.; J. Ray McDermott and Morrison-Knudson. Inspection by Brown & Root, Inc.

United Gas Pipe Line Co.—30-in., contracted, Gonzales, La., to Koscuisko, Miss. Texas-Louisiana Contractors. Completion date 11-51.

United Gas Pipe Line Co.—24-in., contracted, Baxterville, La., to McComb; Texas-Louisiana Contractors. Completion date 11-51.

U. S. Army Engineers.—190 miles, 6⅝-in., under way, Searsport to Limestone, Me.; Associated Pipe Line Contractors, Inc. Completion date 10-15-51.

Utah Natural Gas Co.—360 miles, 22-in., proposed, San Juan Basin area to Salt Lake Utah.

Virginia Natural Gas Co.—153 miles, Buckingham to Richmond and Portsmouth, Va.

Westcoast Transmission Co., Ltd.—1,408 miles, 30-in., planned, northern Alberta to Vancouver, B. C., and northern California.

Western Kentucky Gas Co.—2 to 4-in., under way, additions to present system; Modern Welding Co., Inc., contractor.

Western Pipe Lines.—1,200 miles, 22-in., planned Southern Alberta to Duluth, Minn.

West Texas Gas Co.—27 miles, 10-in., authorized, Lubbock to Abernathy, Tex.

Foreign Crude-Oil Pipe Lines—Planned and Under Way

Alberta Pacific Oil Pipe Line Co. (Bro-

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kaw, Dixon, McKee).—970 miles, 16-in. proposed, Edmonton south to Kingsgate, B. C., to Washington to Vancouver, B. C.

Basrah Petroleum Co.—72 miles, 12-16-in., under way, Zubair to Fao, Iraq.

Cia. de Petroleo Ganso Azul, Ltd.—48 miles, 4-in., planned, Ganso Azul field to Pucalpa on upper Ucayali River, Peru.

Condor S.P.A. (Shell).—80 miles, planned, Genoa to Rho, near Milan, Italy.

Direccion General de Yacimientos Petroliferos Fiscales.—409 miles, under way, Plaza Huincul to Bahia Blanca, Argentina.

Independent Pipe Line Co.—721 miles, 16-18-22-in., proposed, Edmonton to Vancouver. Spreads as follows: 185 miles of 22-in.; 391 miles, 20-in.; 95 miles, 16-in.; and 30 miles, 18-in.

Iraq Petroleum Co., Ltd.—556 miles, 30-32-in., under way, Kirkuk, Iraq, to Banias, Syria, 1952; Bechtel-Kirkuk, contractor.

Middle East Pipelines, Ltd.—800 miles, 34-36-in., planned, Iran to a Levantine port.

Petroleos Mexicanos.—145 miles, 12-in., considered, 18 de Marzo field via Reynosa to Monterrey, Mexico.

Petroleos Mexicanos.—100 miles, planned, Isthmus of Tehuantepec, Jose Colomo to El Plan field, Minatitlan.

Shell Caribbean Petroleum Corp.—16 miles, 20-in., under way, Across Lake Maracaibo, Venezuela, S. A. Mahoney Contracting Co.; Angelo Tavernaro, superintendent.

Shell Caribbean Petroleum Co.—165 miles, 30-in., under way; Palmarejo to terminals on the Paraguana Peninsula (Cardon and Las Piedras, Venezuela), 12-51. Land sections contracted by Williams Brothers, de Venezuela, S. A., Charles P. Williams, manager, Marvin E. Jones, superintendent. Water crossings contracted by Mahoney Contracting Co.

Shell Caribbean Petroleum Co.—16 miles, 14-in., under way, Tia Juana to Cabimas (hot oil).

Trans-Mountain Oil Pipe Line Co.—715 miles, proposed, Edmonton, Alta., to Vancouver, B. C. Canadian Bechtel, Ltd. contractor. Completion date 1952.

Winnipeg Pipe Line Co., Ltd.—75 miles, 10-in., under way, Gretna to Winnipeg, Manitoba; Sparling-Fowler Co., Ltd.

Foreign Products Pipe Lines—Planned and Under Way

Colombia Ministry of Petroleum.—90 miles, 8-in., planned, Puerto Berrio to La Dorada, Colombia.

Colombia Ministry of Petroleum.—113 miles, 6-in., contracted, Puerto Berrio to Acededo near Medellin, Colombia. Carolina Construction Co.

Colombian Ministry of Petroleum.—75 miles, 4-in., planned, Buena Ventura to Cali, Colombia.

Empresa de Ferrocarriles Ecuatorianos.—50 miles, 4-in., under way, Guayaquil to Palmira, Ecuador. J. A. Jones, contractor.

Estrada de Ferro Santos Jundiai.—32 miles, 10-in., under way, Santos to Sao Paulo, Brazil; Techint, contractor.

Estrada de Ferro Santos a Jundiai.—32 miles, 18-in., under way, Santos to Sao Paulo, Brazil (fuel oil line); Techint, contractor.

Governments of Southern Rhodesia and Portuguese East Africa.—200 miles, considered, Beria, Portuguese Mozambique to Umtali, Southern Rhodesia.

Imperial Oil Co., Ltd.—10-in., planned, Sarnia to London, Hamilton to Toronto.

Petrocongo (Sub. Cie. Financiere Belge des Petroles, S. A.).—225 miles, considered, Ango-Ango to Leopoldville, Belgian Congo.

Petroleos Mexicanos.—153 miles, 10-in., under way, Minatitlan to Salina Cruz, Mexico.

Societe des Transports Petroliers par Pipe Line.—140 miles, 10-in., under way, Le Havre to Paris, France. Entrepose, contractor. Completion date 1952.

State of Cundinamarca, Colombia.—120 miles, 6-in., Puerto Salgar, to Bogota, Colombia; Williams Brothers Corp., David Louthen, manager, Bogota.

Trans-Northern Pipe Line Co.—400 miles, proposed, Hamilton, Ont., to Toronto, Ont., to Montreal, Que., Canada.

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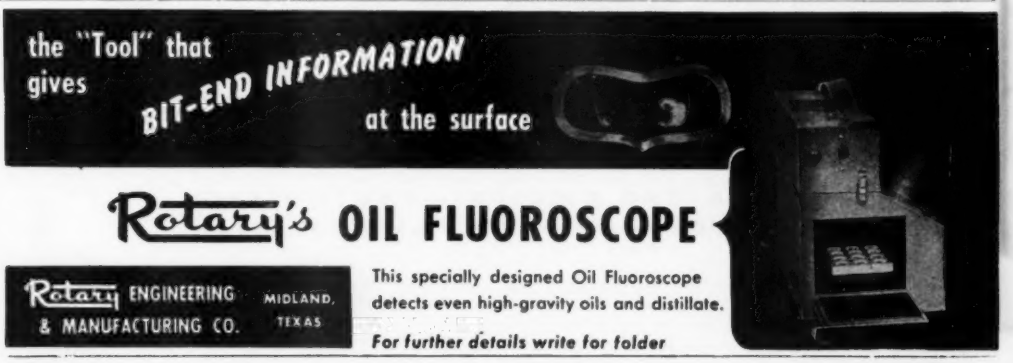
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Among the Drilling Contractors

Big Chief Making Hole On San Juan Deep Test

Big Chief Drilling Co., Oklahoma City, is making hole below surface string at 1 Government, SE SE SE 6-28n-2w, Rio Arriba County, New Mexico, for Continental Oil Co. It will be a 10,000-ft. test on the east side of San Juan basin and will be one of the few tests to the basement rocks outside of Barker Creek and Ute dome. It is situated on the South Dulce geophysical prospect.

Crews set the 13⅜-in. surface pipe at 831 ft. Operators contemplate setting 9⅝-in. pipe at about 6,700 ft. in top of the Dakota and the 7-in. long string at about 10,000 ft. Elevation is 7,314 ft. R.B.

Big Chief has a Model 1050 draw works equipped with 4-in. brake. Slush pumps are D-500 and D-300 powered by three GM twin diesels. Rig is mounted on 14-ft. substructure and equipped with 136-ft. mast.

R. M. Hurt, Farmington, N. M., is manager of New Mexico district for Big Chief.

Ohio Standard to Use 5 Rigs in Saskatchewan

Five drilling rigs will be in operation by July 15 on acreage recently acquired in Saskatchewan, Canada, by Standard Oil Co. (Ohio) from Sohio Petroleum Co. one of the rigs will be capable of drilling to 15,000 ft.

Standard plans a 10-well test program which will earn the firm 1,200,000 net acres out of a gross acreage agreement involving 2,400,000 acres located in Saskatchewan.

The program marks the third of a series of similar farmout agreements from Sohio as operator for the Sohio group.

S. R. Knapp (left), toolpusher, Falcon Seaboard Drilling Co., and G. C. Bankston, exploitation engineer, Shell Oil Co., in the active Elk City field, located in Beckham and Washita counties, western Oklahoma.

More than 2,700 Rigs Reported in Operation

The number of operating rotary rigs in the United States and western Canada passed the 2,700 mark during the week ended July 2, setting a new all-time record. An increase of 33 rigs was recorded during the week, 20 being in the United States and 13 in western Canada. There were 384 more rigs running than at the same time a year ago. Gains were indicated in all sections except Kansas and the Pacific Coast. The drop in Kansas was occasioned mainly by storms and high water conditions which forced suspension of operations in some areas.

ACTIVE ROTARY RIGS*

(United States and Western Canada)

Area—	Week ended 7-2-51	Change week ended 6-25-51	Change week ended 7-3-50
Gulf Coast	590	+ 4	+ 68
W. Tex.-N. M.	904	+15	+174
Ark.-N. La.-E. Tex.	158	+ 4	+ 6
Oklahoma	300	+11	— 13
Kansas-Nebraska	158	—27	+ 23
Illinois-Eastern	148	+ 8	— 5
Rocky Mountains	158	— 8	+ 52
Pacific Coast	156	+13	+ 25
Total U. S.	2,572	+20	+330
Western Canada	141	+13	+ 54
Total	2,713	+33	+384

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States and the Rocky Mountain and Western Canada areas are shown on pages 150 and 151.

Penrod Drilling Co., Shreveport, is starting on a projected 9,500-ft. test 2 miles south of the Sugar Creek field, Claiborne Parish, North Louisiana. Contract is with R. J. Caraway. Location of the test, 1 Spurlock, is in the C NW SW 24-19n-6w.

Burnett Drilling Co. has moved a rig to a wildcat location 3 miles south of the Wesson pool, in Ouachita County, Arkansas, for a projected 4,000-ft. test to be drilled for Lion Oil Co. Location is in the NE SE SW 3-15s-17w.

George P. Livermore, Inc., Lubbock, Tex., has the contract for a well which The Texas Co. will drill about 1¼ miles northwest of its recently completed discovery well, north of the

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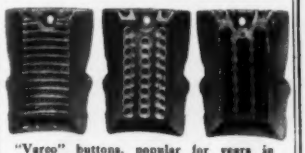

"Varco" buttons, popular for years in rotary drill pipe slips, proved satisfactory and have been adopted and are installed in segments of automatic casing spiders and elevators of various makes. Wickers are removed and holes bored for a maximum number of VARCO casing buttons, to assure uniform and maximum gripping area. Converting buttons for the next smaller casings are available. Write for complete descriptive data.

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Lipps Ranch field, Ochiltree County, Texas Panhandle. Location is for 1 Flowers, in Section 143, Block 13, T&NO Survey. Contract is for 8,900 ft.

Delta Drilling Co., Tyler, Tex., is a partner with Joe B. White in the drilling of a Smackover zone test in the Haynesville field, Claiborne Parish, northern Louisiana. The operation is on the Cadenhead unit in the SE SW 24-23n-8n.

Lyle Cashion, Inc., Jackson and Laurel, Miss., has contracted for a 5,600-ft. test to be drilled for Harris & Payne on a Humble Oil & Refining Co. farmout located ½ mile west of the Eucutta field, Wayne County, Mississippi. Location is in the NW NW 3-9n-9w.

Dorris Ballew, Inc., Natchez, Miss., has the contract for another 7,500-ft. test, which Pure Oil Co. is starting in the Carthage Point area, Adams County, Mississippi. Latest operation is 7 George Armstrong, in 13-6n-3w.

Rexall Drilling Co., Inc., Kilgore, Tex., will drill a 4,200-ft. test for H. A. Clark and W. B. Stone at 1 Kangerga, in the W. R. Moore Survey, Rusk County, East Texas.

Milton Crow, Inc., Shreveport, has a new contract operation under way in the area about 5 miles northwest of Natchitoches, Natchitoches County, North Louisiana. The well, 1 Scarborough-Carver, in 37-9n-8w, is being drilled for W. C. Feazel. Hole is projected to 5,000 ft.

Fred Morgan Drilling Co. will drill for Max Pray and associates at 2 Donnell, a wildcat test located in the C NE SW 23-5n-4w, about a mile west of the Northeast Lindsay field, McClain County, Oklahoma.

Fleet Drilling Co., Ada, Okla., has moved a rig to the East Oconee area, Coal County, Oklahoma, where it will drill for Ray Ryan at 1 Alexander, SE SE NE 28-1n-9e. The new operation is about ¾ mile from Coal Oil & Gas Co.'s prospective oil discovery well, 1 Styron, now testing Oil Creek sand, a new, deeper pay zone for the area.

Deep Fork Drilling Co., Tulsa, is drilling for C. E. McCaughey and associates at 1 Brannon, a newly started wildcat test in the NW NW SE 35-17n-2e, south of Perkins, in northern Lincoln County, Oklahoma.

Deardorf Oil Corp., Oklahoma City, is drilling the second test for Ray Burgin on the edge of the West Davenport pool, Lincoln County, Oklahoma, where the operator is attempting to develop production in the Prue sand. The first test, 1 Taylor, NW NW NW 17-14n-5e, drilled to 4,730 ft., was dry in both the Prue and Wilcox sands. The present operation is 1-A Taylor, in the SE NE NW 17.

Olson Drilling Co., Tulsa, has the contract for the deep wildcat test which Gulf Oil Corp. and Sinclair Oil & Gas Co. will drill in the area 2 miles south of Cheyenne, in the south central part of Roger Mills County, western Oklahoma. The test, projected to 13,500 ft., is designated as 1 Sprowls. Location, in the C NW NW 28-13n-23w, is about 18 miles northwest of the Elk City field.

Crow Drilling Co., Inc., Shreveport, has contracted with J. E. McAneny for a well to be drilled in the C SW NE 10-6n-2w, 4 miles west of the Bentley townsite, Grant Parish, Louisiana. Location is on the operator's Taylor lease. Contract is for 4,500 ft.

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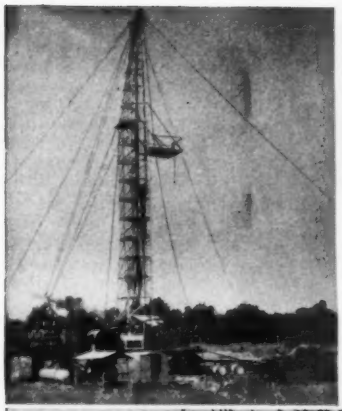
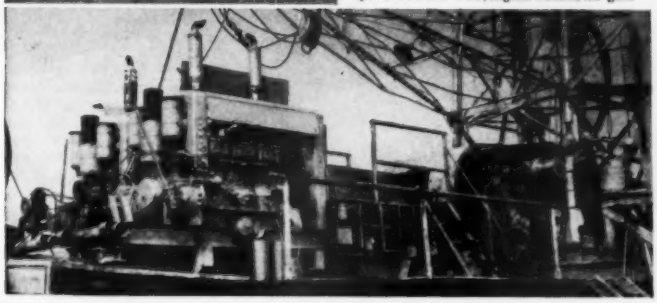


Beene-Hurley Use Low Cost Power on Frank's Rig!

Drillers Beene and Hurley at Bossier City, La., use Frank's portable rig with four Minneapolis-Moline 1210-12A units for power. They are drilling low-cost wells to depths of 6500 feet. The 1210-12A, 12 cylinder unit engines are factory equipped to operate on LP gas or natural gas—the low priced fuels in this area.

Beene and Hurley have mounted two of these units on the drilling table to furnish power to the draw works. These engines are equipped with front power take-off drives and supply 400 hp with LP gas. The other 1210-12A units are remotely located on the mud pump. The complete engineering and installation was done by Beene and Hurley at Shreveport.

Mud pump installation is powered by two MM 1210-12A's.



Two MM 1210-12 on the drilling table operate on low-cost, higher octane LP gas.

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Sales and service of MM oil field engines are handled by the Shrimpton Manufacturing and Supply Co., with branches at Los Angeles, California; Oklahoma City, Oklahoma; and Kilgore, Texas.

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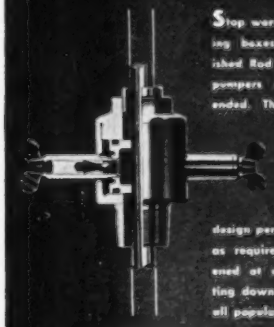

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4 A description of the end-use, exact as to product and its service.

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REFINING

Sweeny Expansion

Phillips' enlarged plant on stream in September

BARTLESVILLE, Okla. — Installation of a new 30,000-bbl. per day crude-distillation unit at Phillips Oil Co.'s Sweeny, Tex., refinery is progressing, and the unit is expected to go on stream in September.

With this unit in crude service, the Sweeny plant will have a crude-topping capacity of 67,000 bbl. per day.

The big still is a conventional unit with fractionation towers and necessary strippers for a complete range of products. Topped crude from atmospheric distillation is heated and subjected to vacuum flashing at about 20 mm. of Hg absolute pressure in order to obtain the maximum of feed for the catalytic cracking unit.

A reforming unit now being used to run crude will be returned to cracking service, raising the plant's present capacity for balanced operation from 37,000 to 50,000 bbl. per day.

Other construction at Sweeny includes modification of the catalytic cracking unit and the rehabilitation and revision of the HF alkylation unit which has been idle since the end of World War II.

Work on the alkylation unit, not placed in operation when Phillips acquired the refinery, involves modernization and improvements in the original design to enable the unit to alkylate the maximum of propylene in addition to all butylenes available.

The former azeo tower is being converted to a catalytic defluorinator. The conversion section is being greatly simplified for operation and maintenance. Facilities are also being added for the production of isopentane and for blending aviation gasoline. The plant will have sufficient feed stock to produce 2,100 bbl. per day of highest-grade aviation gasoline.

C. F. Braun & Co. has contract for construction.

Johnson Oil Refining Co. Tests New Platforming Unit

CLEVELAND, Okla. — Johnson Oil Refining Co. has announced completion of construction of its new 1,800-bbl. platforming unit at the refinery here. The $70,000 unit now is undergoing test runs for plant yield before being placed in full operation.

W. J. Leenhouts, company manager, said the new addition so far had met all requirements. It will enable the company to upgrade gasoline to 95 octane.

Johnson's Cleveland plant has a crude-oil charge capacity of 6,000 bbl. per day and a thermal cracking capacity of 2,750 bbl. per day. The refinery also is equipped with polymerization facilities.

W.P.R.A. to Hear of New Plant Methods, Processes

WICHITA, Kans.—Methods for improving gasoline antiknock quality in small refineries running low-sulfur crude with only crude-topping and thermal cracking equipment will be discussed by Martin L. Alspaugh, Ethyl Corp. laboratories in Detroit, at the 2-day regional meeting of the Western Petroleum Refiners Association here July 19-20.

Alspaugh will discuss data for improving quality from three different approaches: (1) With existing equipment with some sacrifice in yield, (2) by adding purchased high-octane-number blending agents, and (3) by installing new equipment.

V. A. Kalichevsky, consulting chemical engineer for Magnolia Petroleum Co., will describe the company's new automatic process for continuous molding of paraffin wax. *(The Oil and Gas Journal, July 5, page 39).*

A new automatic distillation process developed by Precision Scientific Co. also is scheduled for the technical program.

In addition, Frank A. Watts of the Petroleum Administration for Defense will explain procedure for obtaining controlled materials for plant expansion, and Roy B. Alcott, Tide Water Associated Oil Co., Tulsa, will discuss Wage Stabilization Orders and their effects on refinery operations.

About 75 Mid-Continent refiners are expected to attend, according to J. C. Day, W.P.R.A. secretary.

Celanese Corp. Building Huge New Paraformaldehyde Plant

BISHOP, Tex. — Celanese Corp. of America has commenced construction of a large paraformaldehyde plant at its petrochemical plant here. Productive capacity of the new unit was not announced, but it was said to be so large that it would increase national output of solid formaldehyde several-fold.

The new project, together with one designed to produce Trioxane, a solid heat for use in Armed Forces ration kits, was granted a certificate of necessity by the National Production Authority. Total cost of the two projects was announced at $3,485,535, of

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which 65 per cent was authorized for accelerated amortization.

Paraformaldehyde production during 1949, the latest year for which official figures are yet available, totalled 2,369,000 lb.

Of the many producers of synthetic formaldehyde in aqueous form, at least four now manufacture the solid chemical which contains little water. They include Celanese, duPont, Heyden Chemical, and Cities Service Oil Co. Celanese and Cities Service operations are based on light-hydrocarbon fractions from natural gas and petroleum.

Among the end uses for paraformaldehyde are: plastic electrical parts for condensers, transformers and other radio and radar equipment; resins for heavy-duty brake linings for tanks, trucks, and similar military equipment; as a bactericide in drilling muds; and for production of isoexchange resins used in treating municipal water supplies.

Catalytic to Build Unit

EL PASO.—Catalytic Construction Co., of Philadelphia, will construct a new alkylation plant for Standard Oil Co. of Texas at its refinery here.

M. W. Kellogg Co. has contract for design, engineering, and procurement of materials in connection with the unit.

The plant, which will produce 1,400 bbl. of gasoline daily with an octane rating of approximately 100/130, will cost more than $1,000,000. It will employ a cascade-type reactor and motor-driven agitators to mix butylenes, propylene, and isobutane with sulfuric acid.

Indiana Standard to Build New Isooctyl Alcohol Plant

WOOD RIVER, Ill.—Standard Oil Co. (Ind.) will start construction soon of a complete plant to produce isooctyl alcohol at the refinery here.

Final design of the plant is now being completed, and, according to present timetables, the installation will be completed before the end of 1952 if necessary construction materials can be obtained as required.

Dr. M. G. Paulus, vice president for manufacturing, said the plant is being designed to produce 10,000,000 lb. of the alcohol per year.

Indoil Chemical Co., an Indiana Standard subsidiary, will handle sales of the isooctyl alcohol produced at Wood River.

The chemical is used widely in the manufacture of additives for heavy-duty motor oils. It is also used to make plasticizers for vinyl resins for wire and cable coatings, coating fabrics, and molding parts for electronic equipment.

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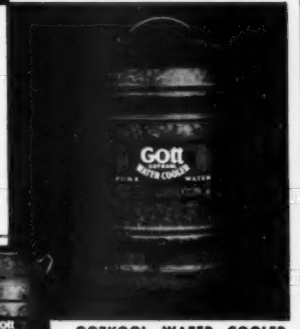

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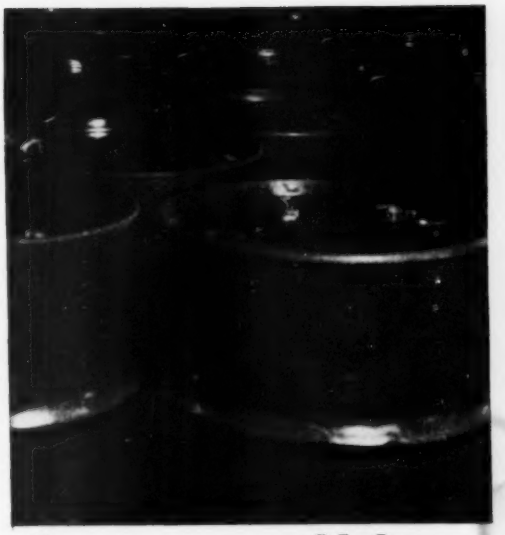

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NATURAL GAS

Kansas Commission Orders Return of Company Bonds

WICHITA. — The Kansas Corporation Commission has ordered return of $2,125,000 in bonds to 11 natural-gas purchasers, after finding them substantially in compliance with its Hugoton field minimum-price order.

The commission, in orders recently made public, also authorized 16 other gas-purchasing companies to quit impounding in their own treasuries funds to be paid to royalty owners under the price order.

The commission on February 18, 1949, required bonds or impounding of funds to protect royalty owners while it defended in court its minimum price for Hugoton field gas. Amounts required were to cover the difference between the minimum price and field prices then paid.

The minimum price—8 cents per 1,000 cu. ft.—was upheld by the courts in test suits brought by major purchasing companies.

A.G.A. Issues Reports on Industrial-Gas Combustion

NEW YORK.—American Gas Association's committee on industrial and commercial-gas research has issued two reports which furnish a foundation for new approaches and thinking on methods of burning industrial gas to meet the new conditions required by the nation's accelerated-production processes, the committee reported last week.

"Advanced Studies in the Combustion of Industrial Gases—Part 2," is the second report issued on methods of increasing the number of B.t.u.'s from industrial gas in a given space and in a given time. Part 1 of this report presented some experimental views of the application of the principle of detonation to the burning of industrial gas. Part 2 of the report, by Dr. John J. Turin, University of Toledo; and Jack Huebler, Surface Combustion Corp., Toledo; further attempts to develop theories of detonation that would apply to industrial gas when fed at continuous rates. The report records observations and experimental reactions in relation to these theories.

The other report is "Gas-Air-Oxygen Combustion Studies." With the advent of lower-cost oxygen of commercial purity, and with the prospect of still lower costs, the use of oxygenated air for many high temperature industrial-heating operations becomes a distinct possibility.

L.P.G. INJECTION.—One of the first L.P.G. injection projects in the San Juan Basin is at Kutz Canyon field, in San Juan County, New Mexico. This view shows injection well of Southern Union Natural Gas Co. for storage of excess butane.

New Jersey Law Regulates Underground Gas Storage

TRENTON, N. J.—Gov. Alfred E. Driscoll has signed into New Jersey law a bill to regulate underground storage of natural or artificial gas or their derivatives.

The new law provides that any individual desiring to drill for the purpose of obtaining access to underground storage must obtain a permit from the state conservation and economic-development department.

The department commissioner is authorized to prescribe rules and regulations governing drilling. Both the state geologist and the water policy and supply council are allowed to review maps of proposed drill sites to determine whether there will be any danger of polluting water supplies.

Firm Seeks State Permit For Underground Storage

CHICAGO. — Natural Gas Storage Co. of Illinois has filed a petition with the Illinois Commerce Commission seeking permission to develop an underground natural-gas-storage project in Kankakee County, Illinois.

The project would enable the firm to store in excess of 90,000,000 cu. ft. of gas in summer months when demand is low, for use during the winter months when demand is unusually heavy.

Natural Gas Storage Co. is a newly organized affiliate of Natural Gas Pipeline Co. of America and Texas Illinois Natural Gas Pipeline Co. It hopes to acquire land rights for development of the storage project without resorting to the power of eminent domain granted to natural-gas companies by the Illinois legislature in its last session.

James F. Oates, Jr., chairman of Natural Gas Pipeline Co. and Texas Illinois, stated that exploratory drilling and other investigations have been completed.

Mississippi River Fuel Amends Storage Application

WASHINGTON.—An amended application has been filed with the Federal Power Commission by Mississippi River Fuel Corp., St. Louis, in connection with its proposal to develop the Waterloo, Ill., oil field as an underground-storage reservoir for natural gas.

The amended application was filed following tests of the field made pursuant to a temporary certificate granted by the FPC January 12.

As now proposed, the project would include about 16.2 miles of pipe line; an estimated 25 wells for the introduction and withdrawal of gas; and 1,800-hp. station for compressing the gas for injection into the reservoir; a dehydration plant with a capacity of 75,000,000 cu. ft. per day; liquid separators; pressure-regulating and metering stations; and other incidental facilities. Total investment cost of the project is estimated at $2,953,125. In its original application, Mississippi proposed to build about 13 miles of pipe line, to drill 25 wells, and to construct regulating and metering equipment at a cost of $1,900,798.

Natural Gasoline

Colorado Interstate Given O.K. to Extract L.P.G.

WICHITA.—Colorado Interstate Gas Co. now has state authority to extract natural gasoline from Hugoton field gas.

The Kansas Corporation Commission has made public at Topeka an order issued June 27 which gives full legal status to the plant, near Lakin, Kans. It has been operating for approximately 12 months.

Commission Chairman Jeff Roberts said company officials admitted that they didn't realize state authority was needed for the plant. It was installed, they said, to dry the natural gas delivered to Denver for fuel use through a 20-in. main transmission line.

The plant, of absorption type, can process 215,000,000 cu. ft. of natural gas daily. Last year, testimony to the commission revealed, it averaged 161 gal. of 14 to 46 Reid vapor pressure gasoline per million cubic feet of gas.

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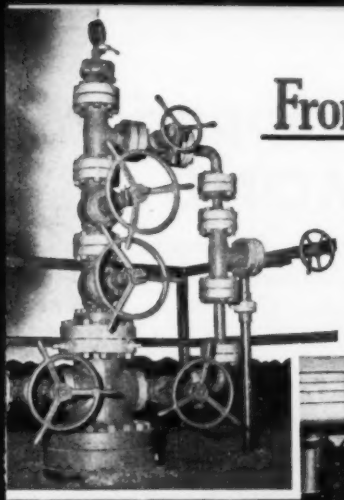

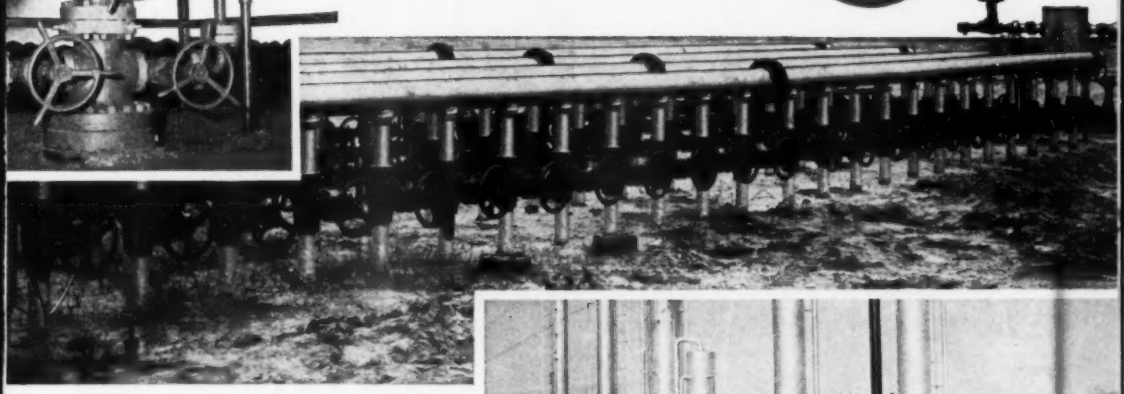

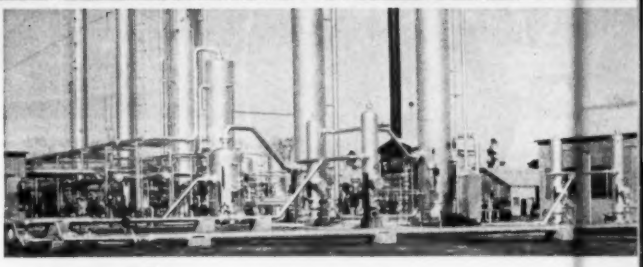

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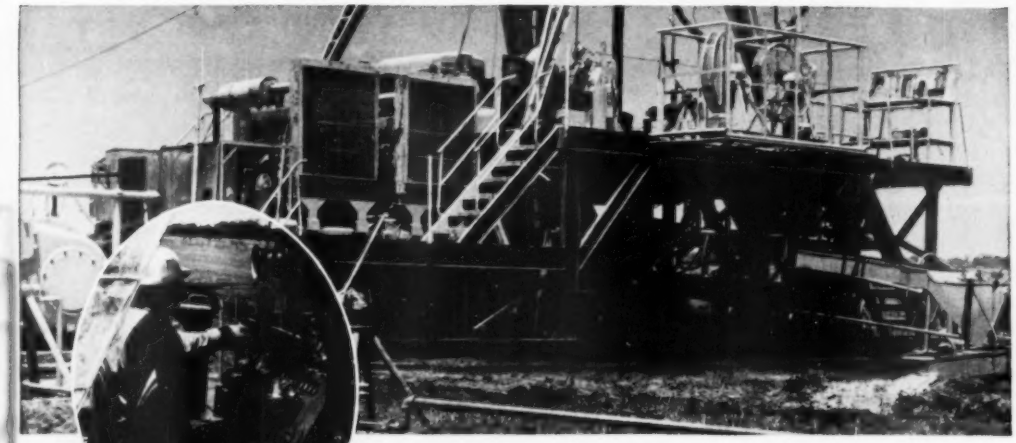

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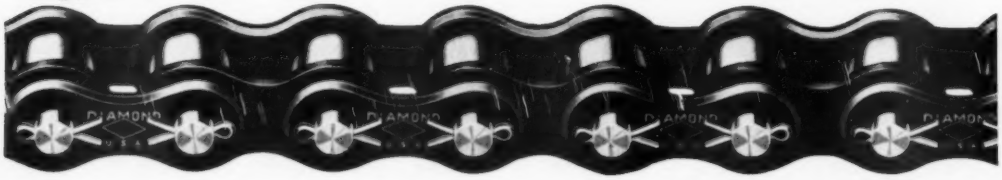


REPORTS ON

Exploration and Drilling

San Juan Basin Surprise

THE only thing that's assured when drilling for oil or gas in a large, sparsely tested sedimentary basin is a surprise, and that's just what developed last week in the San Juan basin of northwestern New Mexico.

Thomas W. Doswell et al 2 Scott-Federal (arrowed on map) tested a strong flow of high-gravity oil from the Tocito sandstone to indicate unconsidered potentialities for this neglected member of the Upper Cretaceous-Mancos shale.

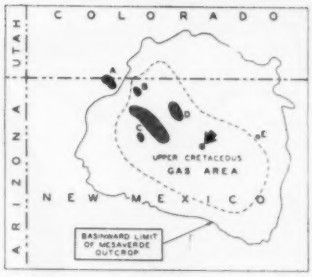
Until the report on Doswell's test was made public, there was little thought given to the possibility that the Tocito would carry oil in commercial quantities. No mention of this Mancos shale member is made in recently published geological reports of the basin.

Doswell's apparent-discovery well, located in 9-26n-6w, Rio Arriba County, topped the Tocito at 6,605 ft. and was drilled to a total depth of 6,700 ft. A drill-stem test of the sandstone interval made gas in 5 minutes and above 50°-gravity oil in 18 minutes. Only a 20-bbl. tank was available at the well site and this was filled in 20 minutes with the oil flowing through a ⅝-in. choke. This barrel-a-minute flow was allowed to continue for an additional 20 minutes before the tool was closed. Gas production during the test was estimated at 2 M.M.c.f. daily. A bottom-hole pressure of 2,280 psi. was recorded. Pipe has been set at 6,615 ft. for production tests.

The Tocito was first formally described in 1924 as a notable bed of coarse, brown, crossbedded sandstone about 35 ft. thick occurring roughly 735 ft. above the base of the Mancos shale. At its type locality, near the junction of the Chaco and San Juan rivers in the northwestern corner of New Mexico (65 miles west of Doswell's well), the Tocito contains lenses of pebbles of chert and quartz as much as ½ in. in diameter.

Just what form the Tocito sandstone assumes in the area of the Doswell well can only be determined by future drilling. There are insufficient data available to venture even a guess as to whether it might have adequate porosity and permeability over a broad area or be a lens or bar with hard-to-find limits.

The San Juan basin's lowermost Upper Cretaceous formations (Mancos and Dakota) and older rocks are essentially untested throughout the greater part of this big basin. Current interest is principally in developing vast gas reserves which have been found in the Pictured Cliffs and the Mesaverde-Point Lookout sandstones of Upper Cretaceous age and at a localized area, in the Hermosa-Paradox of Pennsylvanian age.



The Upper Cretaceous gas area outlined on the map includes that portion of the San Juan basin that some believe to be potentially productive of gas in either or both the Pictured Cliffs and the Point Lookout sandstones, as well as in lesser important Mesaverde group members. The big Upper Cretaceous gas "fields" now being developed are at the La Platte (B), Fulcher Basin-Kutz Canyon area (C), and Blanco-Largo area (D). Major development is following porosity trends but it is significant that no wells within the outline have failed to find gas in one sand or another. Outside of the outlined gas area is Barker Creek-Ute Dome (A) where gas is being produced from the Hermosa-Paradox on two structures separated by a synclinal area.

At E is Continental Oil Co. 1 South Dulce, 6-28n-2w, a 10,000-ft. test. It is reported that this wildcat, now drilling below 2,335 ft., is to be carried to the Pennsylvanian regardless of what is found up the hole. Continental is looking for the wedge edge of Pennsylvanian porosity which is believed to develop along a roughly northeast-southwest trending belt that crosses the basin somewhere in the general neighborhood of Continental's wildcat. The search for this stratigraphic trap may turn up more surprises that will add to the growing attractions of this basin. *Philip C. Ingalls.*

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

ROCKY MOUNTAIN AREA.—Union Oil Co. of California has plugged a second hole in its series of wildcats (strat tests) in North Dakota and made location for another. Stanolind Oil & Gas Co. completed Mesaverde discovery well at Beaver Creek, Wyoming, with the well flowing 195 bbl. of oil in 18 hours through choke.

OKLAHOMA.—Carter Oil Co. appears virtually assured of a good producer in the Oil Creek sand at its West Noble deeper-pay test. Flynn Oil Co. recovered oil on a drill-stem test to indicate a Hunton lime discovery in Lincoln County.

MISSISSIPPI.—Two discoveries, one in Young County and the other in Archer County, have been completed flowing oil from pays near 5,000 ft.

SOUTH LOUISIANA.—Humble Oil & Refining Co. has opened gas-condensate production midway between Golden Meadow and Bay de Chene fields at 10,262-66 ft.

TEXAS PANHANDLE.—In the southwest corner of Hansford County, two wildcats had Pennsylvanian production. J. M. Huber Corp. 1 Womble tested 16 bbl. oil in 8 hours, plus gas at 2,830,000 cu. ft. daily from pay at 5,266-5,340 ft. Phillips Petroleum 1 Cator tested some 1,600,000 cu. ft. of gas daily from 5,270-5,320 ft.

Measure any other pressure control equipment against the advantages of the

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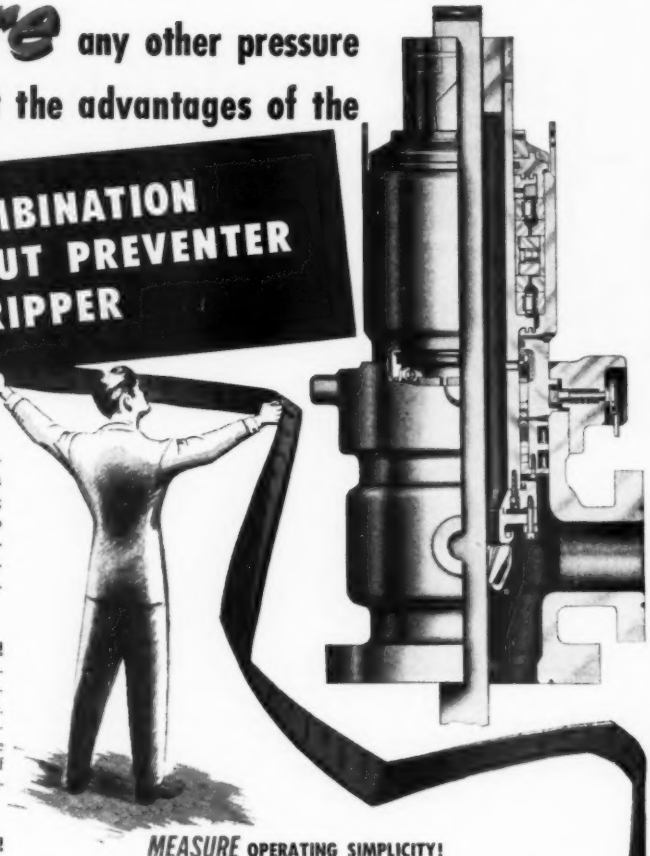

There's only one way to fully appreciate the unequalled pressure protection you get in the Shaffer Combination Rotating Blowout Preventer and Stripper . . . that's to measure—point-by-point—*any other* equipment on the market against the unique operating features incorporated into this unusually effective unit. For example . . .

MEASURE FOOL-PROOF DEPENDABILITY!

The Shaffer Combination Rotating Blowout Preventer and Stripper maintains its leak-proof seal *continuously* while pipe is in the hole. There is nothing to *operate*, nothing to *remember*, nothing to *forget*, when sudden pressure emergencies occur. The unit is *always* sealed off around the drill string, ready for instant protection against pressure blowouts!

MEASURE ALL-AROUND ADAPTABILITY!

The Stripper Rubber seals off around *any shape or diameter* in the drill string (excepting such abnormally large diameters as the bit and reamer). Automatic expansion and contraction accommodates any type of kelly—square, hexagonal or octagonal—as well as couplings, tool joints, subs, drill collars and pipe, whether flush, coupled or upset. *No special equipment or special pipe is needed with this unit!*

MEASURE TROUBLE-FREE OPERATION!

Since the Stripper Rubber rotates *with* the kelly—not around it—there is virtually no wear on the rubber. Patented steel reinforcing latches provide an expandable steel barrier that prevents extrusion of the Stripper Rubber either by high pressures or by pulling large diameters through it—yet maximum elasticity of the rubber is maintained. In addition, the bearing assembly upon which the unit rotates has separate thrust and radial bearings to withstand the severe loads occasioned by modern drilling practices . . . and the bearings are lifetime prepacked with heat-resisting lubricant. Maintenance is negligible!

MEASURE OPERATING SIMPLICITY!

When the drill string is in the hole, adjustment to different diameters and shapes in the string is *completely automatic*—no manual operations are necessary. When running large tools such as bits or reamers through the unit, simply pull a spring latch, rotate the bonnet 1/6 turn and the entire internal mechanism as a unit can be withdrawn to permit removal of the tools. Simply reverse the operation when going back into the hole.

MEASURE SPACE-SAVING COMPACTNESS!

The Shaffer Combination Rotating Blowout Preventer and Stripper is so engineered that vertical height in the drilling riser is kept at a minimum. It can be installed even under the most difficult space limitations. Moreover, flow connections built directly into the body eliminate need for spools or other equipment for overflow connections.

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Appalachian-Ohio

Deep Gasser Is Completed In Westmoreland County

PITTSBURGH.—A deep wildcat test was completed successfully in Unity Township, Westmoreland County, Southwest Pennsylvania. The well is Peoples Natural Gas Co., 1-3921 Fred Musnug, elevation 2,100 ft., which made 7,194,000 cu. ft. of gas, with rock pressure at 3,600 psi. in 24 hours. Tops were: Onondaga, 7,980 ft.; chert, 8,003 ft.; gas, 8,031-60 ft. and 8,064 ft.; Oriskany sand, 8,150-8,203 ft.; total depth, 8,330 ft.

Locations were made for three shallow sand wells in Boggs and Madison townships, Armstrong County; and West Bethlehem Township, Washington County.

In Garrett County, Maryland, Oil Ventures, Inc., completed 1 Earl Hershman, elevation 2,451 ft., as a dry hole, with total depth at 4,323 ft. Eberly & Johnson 1 Wm. White, elevation 2,412 ft., set casing at 3,598 ft. Tops were: Tully, 3,028-3,044 ft., and Onondaga, 3,500 ft. Eberly & Snee 1 Otis Shaham, elevation 2,459 ft., reached Onondaga at 3,372 ft., and is shut down at 3,375 ft.

New York State Natural Gas Corp. 1-N-225 Orville Zitzmiller, elevation 2,403 ft., topped chert, 3,938-4,000 ft. and is drilling at 4,048 ft. Fox & Trimble 1 Myrtle McGee, elevation 3,800 ft., topped Onondaga at 3,762 ft. and is drilling at 3,762 ft.

In Portland district, Preston County, West Virginia, Hope Natural Gas Co. 9636 Margaret C. Kraus, elevation 2,195 ft., gaged 1,981,000 cu. ft. gas, after shot, with rock pressure 2,250 psi. in 44 hours. Tops were: Oriskany sand, 5,248 ft., and gas, 5,250-86 ft. Total depth is 5,377 ft. In Slate district, Wood County, Glen W. Roberts 1 M. W. Farrell, elevation 720 ft., resulted in a dry hole. Tops were: Corniferous lime, 4,869 ft.; Oriskany sand, 5,020-50 ft.; total depth 5,086 ft. In Tridelphia district, Logan County, Hope Natural Gas Co. 9447 Ed Cook tested 3,320,000 cu. ft. of gas in Berea sand at total depth of 3,378 ft.

PENNSYLVANIA SUCCESSFUL WILDCAT

Westmoreland County, Unity Township: Peoples Natural Gas Co. 1-3921 Fred Musnug, elev. 2,100 ft., 7,194,000 cu. ft. gas, rock pressure 3,600 psi. in 24 hours; Onondaga, 7,980 ft.; chert, 8,003 ft.; gas 8,031 ft. and 8,064 ft.; Oriskany sand, 8,150-203 ft.; TD, 8,330 ft.

MARYLAND WILDCAT FAILURE

Garrett County: Oil Ventures, Inc., 1 Earl Hershman, elev. 2,451 ft., dry, TD 4,323 ft.

WEST VIRGINIA SUCCESSFUL WILDCAT

Preston County, Portland district: Hope Natural Gas Co. 9636 Margaret C. Kraus, elev. 2,195 ft., gaged 1,981,000 cu. ft. gas after shot, rock pressure 2,250 psi. in 44 hours; Oriskany sand, 5,248 ft.; gas, 5,250-86 ft.; TD, 5,377 ft.

WEST VIRGINIA WILDCAT FAILURE

Wood County, Slate district: Glen W. Roberts 1 M. W. Farrell, elev. 720 ft., dry; Corniferous lime 4,869 ft.; Oriskany sand, 5,020-50 ft., TD, 5,086 ft.

OHIO

COLUMBUS.—B. H. Putnam et al found small gas shows in Ohio shale, a show at 66 ft. in the Niagara lime topped at 4,114 ft., and 300,000 cu. ft. of gas at 92 ft. in the lime in a wildcat on the Paul McDonald tract in Section 3, Troy Township, Athens County. The bit was lost in the hole at 4,231 ft. and drilling stopped. The well was shot with 10,750 lb. of powder from 3,137-4,222 ft., and gaged 2,290,000 cu. ft. 1 hour after shot. Casing is to be cemented before the final shutin.

The gas pool in the south part of Pleasant Township of Perry County was extended ¼ mile to the west by the 2 John West, Section 4. Clinton sand was logged

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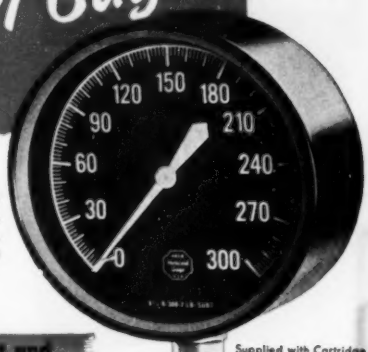

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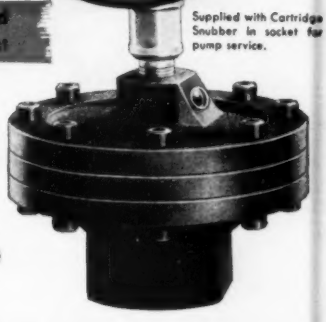

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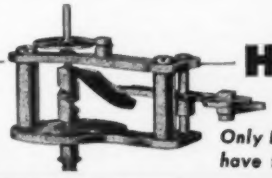

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at 3,704-47 ft. with 1,200,000 cu. ft. of gas, natural.

In Greer pool, Hipp Lumber 3 Frank Heaton, Section 1, Jefferson Township, Knox County, found Clinton at 2,971-3,023 ft., with 6 bbl. of oil, natural. The well was shot and made 70 bbl. in 44 hours.

Pure Oil Co. 7 C. Richards, Third Quarter, New Castle Township of Coshocton County, an outside location to the south, had an oil show in upper Clinton at 3,245-67 ft. After shooting with 100 qt. the well made 26 bbl. in 24 hours.

Texas Gulf Coast

Orange County Discovery Flows 284 Bbl. on Test

HOUSTON.—Orange County's new oil discovery, Ohio Oil Co. 1 Lutcher Moore Lumber Co., C. L. Higginbotham Survey, Abstract 414, flowed 284 bbl. of 40.8°-gravity oil daily on potential test. Flow was gaged through 12/64-in. choke. The hole is bottomed at 9,038 ft. and cased to 8,071 ft. Production is through perforations at 7,983-87 ft. There is some question as to whether the well opened a new field, or is a long southeast extension to Phoenix Lake field of Calcasieu Parish, Louisiana. The new discovery is approximately 1½ miles from the field.

Four miles northeast of Montgomery in Montgomery County, Capital Co., et al, apparently have a new Wilcox strike at 1 Alliance Trust Co. Two oil and one gas sands were logged in the well and operators set pipe and are preparing for production tests. Few details have been released by the operators; however, it is known that the well was drilled to a depth of 11,001 ft. and the three sands were encountered between 10,500 ft. and total depth. It is reported that a 15-20-ft. sand section around 10,700 ft. will be tested.

Southwest Muldroon field, Fayette County, has been extended 1,200 ft. to the southwest at Deep Fork Oil Corp. 1 Standard Trust, James Parrott ⅓ League, Abstract 258. Through perforations in the Wilcox at 2,226-42 ft., the well pumped 71 bbl. of oil daily. Hole is bottomed at 2,274 ft., with 5½-in. casing cemented on bottom.

Also in Fayette County, Sohio Petroleum Co. has apparently opened a new field 5 miles northwest of Flatonia at 1 N. W. Brown Estate. On drill-stem test of Buda lime at 7,837-62 ft., with tool open 30 minutes, and using ¼-in. chokes, the well flowed 500 ft. of water cushion and pipe-line oil. Working pressure was 80 psi. Recovery was 6,000 ft. of pipe-line oil. Hole is bottomed at 7,862 ft. and cased with 7-in. at total depth. The well is located 3½ miles west of production in Southwest Muldroon field.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Calhoun County: Alcoa Mining Co. 163-1 State Lease 35,950, San Antonio Bay, 17½ mi. SW of Port O'Connor, dry, TD 5,910 ft.

Fort Bend County: L. A. Grelling 1 Alice B. Abendroth, H&TC RR Sec. 20, dry, TD 6,350 ft.

Humble Oil & Refining Co. 1 Scanlon Foundation, et al, David Fitzgerald Sur., A-25, dry, TD 8,446 ft.

Harris County: Sam Maceo Oil Operations 1 S. E. Allen Estate, Callahan & Vince Sur. A-9, dry, TD 6,502 ft.

Sinclair Oil & Gas Corp. 1 Henry Krezdorn, Harris County School Land Sec. 3, A-332, dry, TD 12,000 ft.

Karnes County: J. R. Butler 2 Rudolph Kruse, Victor Blanco Gr., A-3, dry, TD 7,444 ft.

W. Earl Rowe, et al, 1 Marguarite Roper, Carlos Martinez Sur. A-6, dry, TD 6,385 ft.

Liberty County: Wood Petroleum Co. H. H.

Lochin, et al, Spencer Kirkham, A-57, dry, TD 9,711 ft.

Orange County: Progress Petroleum Co. of Texas 1 Monroe Teal, D. Suddeth Sur., A-179, dry, TD 8,363 ft.

Polk County: Livingsten Drilling & Well Service, Inc., 3 S. H. Edmonds, Isaac Parker Sur., A-61, dry, TD 3,396 ft.

Rocky Mountain

Union Plugs Second Strat Test in Devils Lake Area

DENVER.—Union Oil Co. of California has plugged the second in its series of strat tests in Devils Lake region on the northeast side of North Dakota. The well, located in NW NW NW 28-159n-63w, Cavalier County, went to 3,409 ft., total depth, probably in granite. Union has made location for another of the series in CNW SW 32-160n-60w, and is moving in material. Hancock Oil Co. of Los Angeles and Signal Oil & Gas Co. have joined Union in this extensive exploratory program through this area.

In Pierce County, southwest of Devils Lake region, Ajax Oil Co., of Casper, has spudded a proposed deep wildcat. Amerada is moving in rotary for 1 Bakken, CSW NW 12-157n-95w, in the Tioga area. Williams County, north of the company's deep test. At 1 Iverson, CSW SW 6-155n-95w, at Beaver Lodge, Amerada is still fishing stuck drill pipe with the well at 11,955 ft. Numerous reports from Bismarck indicate that there will be additional wildcats starting this year, throughout the Williston Basin.

In eastern Montana, Texas Pacific Coal & Oil Co. and Pure Oil Co. have announced location for an important deep test on Plevna anticline, Fallon County. The well will go to Ordovician and is 1 Cox, CSW SE 23-3n-61e, west of the Baker-Glendive anticline. The Texas Co. and Shell Oil Co. are now drilling along the general Baker-Glendive anticlinal axis. Shell's 1 Northern Pacific, SE NW NW 19-23n-56e, in the Richey area, Dawson County, is at 7,092 ft., total depth, with operator running electric log for correlation purposes.

Thomas W. Doswell, of Dallas, recovered oil on drill-stem test at an important San Juan basin, New Mexico, wildcat this week. The well, 2 Scott-Federal, CNW SE 9-26n-6w, in the South Lago area, Rio Arriba County, flowed oil in 18 minutes on 30-minute test of Tocito sand between 6,605-6,700 ft. The well flowed 20 bbl. of oil in 25 minutes on a later test of the same zone. This wildcat is located southeast of the Kutz Canyon area, where gas is produced from the Pictured Cliffs formation, and northwest of Lindrith, where oil is produced from the Dakota. This development will undoubtedly lead to a very active exploratory campaign through this portion of the basin.

Completion of Stanolind Oil & Gas Co.'s first Mesa Verde oil producer at Beaver Creek, Wyo., indicates that formation may have more thorough checking in other areas of the state. The well flowed 195 bbl. of oil in 18 hours through 24/64-in. choke from Mesa Verde between 3,693-3,828 ft. The well is 15 Unit, SE SW NW 10-33n-96w, and Stanolind previously established Dakota-Lakota formation gas production and Tensleep oil production in the field.

There were 23 completions in Wyoming, 8 in Colorado, 2 in Montana, and 1 in western Nebraska. Sinclair Oil & Gas Co. plugged another in the series of wildcats around the South Meadow Creek area, Johnson County, Wyoming, and started a new test in the West Meadow Creek area. Both wells are Lakota sand tests. At West Big Muddy, Natrona County, Shell Oil Co. plugged a wildcat test after finding water in Lakota. In Montana The Texas Co. plugged a wildcat in the Pole Creek area, Golden Valley County, with the well at 3,865 ft., total depth, in Kibbey.

Gulf Oil Corp. announced location for a 12,000-ft. Phosphoria-Tensleep test in the North Gooseberry area, west of Worland. The well is 1 Stockham-Federal, CSE NW 2-64n-94w, Washakie County, Montana. Mountain Fuel Supply Co. will drill a Lakota sand test to around 6,000 ft. at 1 Capital Co., SE SW NE 10-15n-104w, on the Pretty Water Unit, Sweetwater County. This wildcat is southwest of the South Baxter Basin field and west of Salt Wells, both of which produce gas from this formation. Shell Oil Co., Niloco Oil Co. of Dallas, and Lion Oil Co. have announced new locations in the current Denver-Julesburg wildcat campaign through northeastern Colorado. The Lion well, 1 Chrismer, SE SW SE 2-2n-48w, North Yuma area, Yuma County, will be a pre-Cambrian test to around 6,700 ft. Niloco has started on 1 Ward, NW SW SW 31-1s-53w, in Washington County. Shell's 1 State, SW NE NE 16-8n-53w, will be another Graneros-Cloverly series test through the area where eight pools have been discovered in the past 2 years.

COLORADO WILDCAT FAILURES

El Paso County, wildcat: Voltz Drilling Co. 1 Christian, CSW SW 12-16s-66e; suspended. Niobrara 1,880 ft., Timpas 2,318 ft., Codell 2,425 ft.

South Fort Morgan, Morgan County: Ryan Oil Co. 1 Gladys B. Johnston, SE SE SE 34-2n-58w; abnd. Niobrara 4,947 ft., Timpas 5,303 ft., Carlile 5,352 ft., "D" sand 5,750 ft., "J" sand 5,819 ft., "M" sand 6,100 ft., Morrison 6,198 ft.

Otero County, East Timpas: A. B. Oldham 1 D. A. Gaulke, NW NE NE 15-26s-56w; 3,316 ft. TD; suspended. Dakota 350 ft., Morrison 650 ft., Triassic 940-3,316 ft.

WYOMING WILDCAT FAILURES

South Meadow Creek, Johnson County: Sinclair Oil & Gas Co. 2 Thomas Weadick, SW NE SE 24-51n-78w; 7,635 ft. TD;

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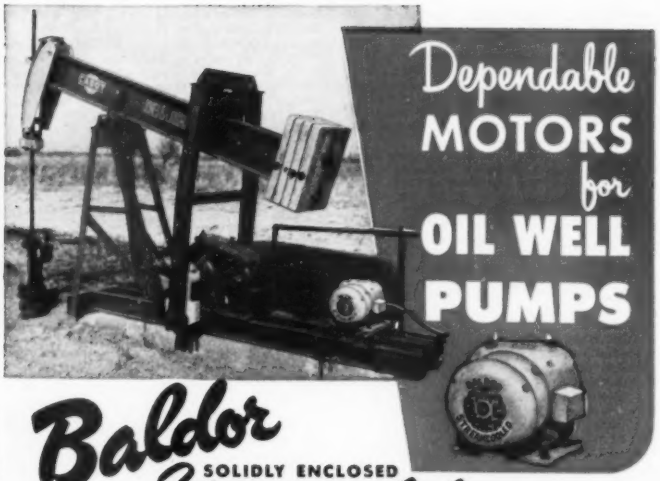
THE OIL AND GAS JOURNAL

"I told you so, Judson—there is oil around here—they're going to cook us in it!"



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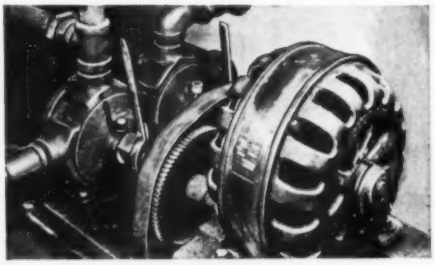

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abdn. Teapot 2,273 ft., Parkman 2,640 ft., Sussex 3,737 ft., Shannon 4,198 ft., base Shannon 4,293 ft., Niobrara 5,575 ft., first Frontier 6,212 ft., second Frontier 6,629 ft., Muddy 7,338 ft., Dakota 7,510 ft., Lakota 7,598 ft., Morrison 7,620 ft.

West Big Muddy, Natrona County: Shell Oil Co. 1 Freiberg-Altman, CNW NW 15-33n-77w; 5,077 ft. TD; abdn. Shannon 1,475 ft., Niobrara 3,000 ft., Frontier 3,722 ft., Stray sand 4,136-53 ft., Mowry 4,620 ft., Dakota 4,979 ft., Lakota 5,055 ft.

North Horse Center, Park County: E. A. Tennyson 1 Government, SW SE NW 20-52n-101w; ssupended. Dakota 595 ft., Morrison 960 ft.

MONTANA WILDCAT FAILURE

Pole Creek, Golden Valley County: The Texas Co. 1 NPRR "F," CNW NE 11-9n-22e; 3,865 ft. TD; abnd. First Cat Creek 2,363 ft., Kootenai 2,458 ft., third Cat Creek 2,716 ft., Morrison 2,786 ft., Ellis 3,047 ft., Gypsum Springs 3,258 ft., Amsden 3,268 ft., Heath 3,495 ft., Otter 3,543 ft., Kibbey 3,800 ft.

Oklahoma

West Noble Area Revived With Oil Creek Producer

CARTER OIL CO. appears virtually assured of a good producer in Oil Creek sand at its 2 N. R. Johnson, West Noble area, McClain County, and following tests of that pay, is pulling tubing preparatory to perforating casing and testing other indicated pay zones. The well reopens production in the area, in which the discovery well (1 N. R. Johnson), drilled in 1944, and now abandoned, has been the only producer until now. Production of the discovery well, located on the same 40 acres as the new well, was from Bromide sand.

Testing the Oil Creek sand with casing perforated at 8,967-9,010 ft., the new well flowed 135 bbl. of oil in 24 hours through 7/16-in. choke on its last reported gage. Water cut, which on earlier tests had run as high as 5 per cent, had dropped to less than 1 per cent at the end of the gage. During previous tests through open tubing, the well flowed 355 bbl. in one 8-hour gage.

In addition to the Oil Creek, McLish sand also gave indications of good production. A drill-stem test in that zone at 8,640-95 ft. got a strong flow of gas and oil, and yielded 6,150 ft. of oil and 1,305 ft. of oil and gas-cut water in the breakdown.

Producers Development Corp. 1 White, a wildcat in the C SE NE 20-9n-2w, 5 miles west of Norman, Cleveland County, is reported unofficially to have flowed at the rate of 180 bbl. of oil per day through 9/64-in. choke while testing Tulip Creek sand, opposite which casing is perforated at 9,712-52 ft. Flowing pressure on the tubing gaged 1,200 psi. The hole, drilled by Sinclair Oil & Gas Co. to 8,895 ft. in 1948, was deepened by the present operator to 10,198 ft. Good showings also were reported in the Wilcox sand at 9,392-9,537 ft. and the Joins sand at 10,152-98 ft. The latter zones have not been tested.

Discovery of a new Hunton lime pool is indicated in the area 4 miles northeast of Prague, Lincoln County, where Flynn Oil Co. 1 Terry, SW SW SE 14-12n-6e, had 220 ft. of free oil in the pipe following a drill-stem test at 4,391-4,410 ft. Tester was open 2 hours. Top of the Hunton is 4,389 ft. Flow pressure during the test was 200 psi. Casing has been run to the top of the pay for completion.

Recent discovery of Cleveland sand production south of the South Davenport pool (Prue sand production), Lincoln County, is being confirmed with a second well a north offset to the initial producer, Keystone Oil Co. and Larsco Drilling Co. 1 Cox. The new well, 2 Cox, NW SW SE 22-14n-5e.

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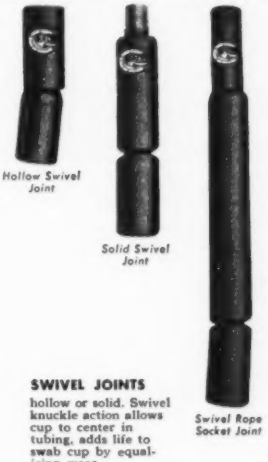

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flowed at rates of from 10 to 20 bbl. of oil per day but formation will be fractured in an effort to improve production. Total depth is 2,479 ft. with casing at 2,742 ft.

OKLAHOMA SUCCESSFUL WILDCATS

Comanche County: Texola Drilling 1 J. L. Brown, SE SW NW 24-4n-11w, flowed 15 bbl. 39°-gravity oil from Tulip Creek at 2,434-54 ft. and 2,458-69 ft., and McLish at 2,764-70 ft., 2,748-60 ft., and 2,669-75 ft., TD 3,003 ft.

Lincoln County: Keystone Oil 1 Cox, SW SW SE 22-14n-5e, flowed 66 bbl. oil from conglomerate at 2,746-55 ft., TD.

McElreath et al 2 Robinson, NW NW SW 3-14n-6e, flowed 372 bbl. 45°-gravity oil from Hunton at 3,982-4,014 ft., TD 4,225 ft.

Stephens County: Skelly 1 R. H. Brown, NE SE NE 14-2s-4w, pumped 29 bbl. 35°-gravity oil from lower Tussy sand at 3,848-70 ft., TD 4,550 ft., geological test in Milroy.

Skelly 1 F. H. Jones, NE SW NE 23-2s-4w, pumped 219 bbl. 34.1°-gravity oil from 1,940-58 ft., 1,992-2,000 ft., 2,085-2,100 ft., 2,220-45ft., 2,255-70 ft., and 2,730-60 ft., Td 6,196 ft., geological test in Milroy.

OKLAHOMA WILDCAT FAILURES

Cleveland County: Amerada and Skelly unit 1 Brendle, SE NE SE 26-9n-1e, dry, TD 5,915 ft.

Oklahoma County: Eason Oil 1 Horseshoe Lake, NW NW NE 26-12n-1e, dry, TD 6,081 ft.

Okmulgee County: Absher & Booth 1 Musgrove, NW SW NW 30-13n-11e, dry, TD 3,443 ft.

Payne County: Flynn Oil 1 Hambry, SE SE NE 9-19n-3e, dry, TD 4,546 ft.

Seminole County: Mohawk Drilling 1 Factor, SE SE SW 11-7n-7e, dry, TD 3,931 ft.

Stephens County: Mack Oil 1 Hopps, NE NW SE 22-2n-5w, dry, TD 5,359 ft.

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Permian Basin

Southeast Borden County Has Two New Reef Prospects

MIDLAND, Tex.—Southeast Borden County had two new reef prospects in sight at week's end.

Lario Oil & Gas Co. 1 T. L. Griffin, southwest of the Reinecke field and in the southwest corner of Section 46, developed oil on a drill-stem test of the Pennsylvanian reef between 7,095-7,110 ft.

Top of the reef, which had drilled extra soft, was placed at 7,100 ft., on elevation of 2,381 ft. That top was approximately 70 ft. high to dry holes in the northwest and southeast corners of the same section. On the test, gas surfaced in 5 minutes and clean, 46°-gravity oil in 11 minutes. The well made a steady flow of 2 hours, at an estimated rate of 30 bbl. hourly. Operators were to run surveys before setting casing.

Northwest of Vealmoor field, Gulf Oil Corp. 1 Higginbotham, wildcat in 13-32-3n-T&P, recovered 180 ft. of oil and some salt water after reperforating in the reef from 7,970-8,070 ft. Recovery was on a 1-hour test. A second drill-stem test was under way at last report.

In Howard County, Southern Minerals Corp. 1 Weaver, wildcat northeast of Coahoma, topped the Pennsylvanian reef at 8,050 ft. on elevation of 2,330 ft. Drilling continued after a 16-minute drill-stem test from 8,046-67 ft. recovered 20 ft. of mud.

Standard Oil Co. of Texas 1 Adams, northeast of Ackerly, was running drill-stem test from 8,086-8,135 ft.

In Martin County, Deep Rock Oil Corp. 1 McWhorter, north of Stanton, recovered 938 ft. of oil and 940 ft. of salt water on a test in the Spraberry from 7,760-7,850 ft., then prepared to run tubing and make a production test of the same section.

Continental Oil Co. 1-A Shannon Estate, Crockett County Ellenburger discovery between Todd Deep and Midway Lane Ellenburger fields, completed as an Ellenburger discovery, flowing at the rate of 2,580 bbl. of 39°-gravity oil a day. Potential was based on a 6-hour test of 645 bbl. of oil through ½-in. choke, from open hole at 7,185-7,236 ft. The firm's 3-A Shannon was started as a northeast offset to the discovery.

In Upton County, Sinclair Oil & Gas Co. 1 Windham, offset to the discovery of McElroy Pennsylvanian field, had top of the Ellenburger at 12,049 ft., by samples, said to be some 30 ft. low to the discovery. It was drilling ahead at 12,150 ft.

Yoakum County's deep wildcat, General American Oil Co. 1 Richmond, reported top of the Mississippian at 11,220 ft., by samples, and was drilling ahead at 11,253 ft.

Cities Service Oil Co. 1 Noelke, Upton County wildcat 10 miles south of Rankin, was dry in the Ellenburger, from top at 6,775 ft. to 6,815 ft., total depth. Drill-stem test of the section recovered mud and sulfur water with no shows.

Humble Oil & Refining Co. 1-B Evans, Winkler County deep wildcat, prepared to drill-stem test in the Ellenburger from 11,680-715 ft., top of the formation and total depth.

Magnolia Petroleum Co. has announced a 14,000-ft. Ellenburger test in Andrews County. Operation will be the 1 University in 17-8-University Lands, about 12 miles north of Andrews, near the county line and northeast of the Means field.

Magnolia 1 Tom Pea was drilling below 13,545 ft.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCATS

Dawson County: James. H Snowden 1 Carrie S. Dean "32," 32-1-J. Poitevant Sur., TD 8,700 ft., elev. 2,731 ft., Spraberry 6,420 ft., pay 7,276-86 ft., IP pumped 44.3 bbl. 39°-gravity oil a day.

Glasscock County: El Capitan Oil Co. 1 Whitehouse, 47-37-4S-T&P, TD 7,028 ft., elev. 2,731 ft., Spraberry 6,964 ft., IP

flowed 322 bbl. 36°-gravity oil a day, ½-in. choke, GOR 663 cu. ft., TP 50 psi.

Midland County: Fogelson & Pauley 1 Walton-Judkins, 46-37-3S-T&P, TD 7,176 ft., elev. 2,679 ft., Spraberry 7,090 ft., IP flowed 303 bbl. 38°-gravity oil a day, ½-in. choke, GOR 651 cu. ft., TP 80 psi.

Upton County: Bayer-Hunefelt Drilling Co. 1 O'Neal, 184-CCSD&RGNG, TD 3,489 ft., pay 3,444-88 ft., IP flowed 60 bbl. 31°-gravity oil a day.

A. A. Cameron-Jay Simmons 1-29 F. F. Elkins, 29-37-5S-T&P, TD 7,210 ft., pay 7,013 ft., IP flowed 185 bbl. 36°-gravity oil a day, ½-in. choke, GOR 710 cu. ft., TP 90-150 psi.

Val Verde County: R. J. Carraway 1 Guida Rose, Sec. 2, GC&SF Sur., TD 11,590 ft., elev. 1,971 ft., Strawn limestone 9,890 ft., gas pay 10,005 ft., IP 35,000,000 cu. ft., open 2-in. tubing.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Andrews County: Cities Service Oil Co. 1 AK University, 12-14-University Lands, TD 12,434 ft., elev. 3,209 ft., Pennsylvanian 8,700 ft., Devonian 10,140 ft., Ellenburger 12,395 ft.

Crane County: Gulf Oil Corp. 1-A Dawson, 12-6-H&TC, dry, TD 2,995 ft.

Placid Oil Co. 2 A. R. Eppenauer, 14-6-H&TC, dry, TD 3,117 ft., elev. 2,373 ft., San Andres 2,060 ft.

Dawson County: J. H. Snowden 1 Carrie S. Dean "43," 43-1-J. Poitevant Sur., dry, TD 8,580 ft., elev. 2,768 ft., Spraberry 6,544 ft., reef 8,460 ft.

Gaines County: Lytle & Hibbert 1 J. A. Sparks, 397-G-CCSD&RGNG, dry, TD 10,710 ft., elev. 3,438 ft., Pennsylvanian 8,990 ft., Mississippian 9,360 ft., Woodford 9,768 ft., Devonian 10,640 ft.

Howard County: J. C. Barnes 1 O. E. Hamlin, 16-33-2S-T&P, dry, TD 10,633 ft., elev. 2,667 ft., Spraberry 6,230 ft., Fusselman 10,400 ft., Ellenburger 10,555 ft.

Kent County Kewanee Oil Co. 1-A Wyatt, 1-2-H&GN, dry, TD 7,157 ft., elev. 2,107 ft., reef 6,600 ft.

Loving County: Intercoast Petroleum Corp. 1-B Johnson, 12-56-T1-T&P, dry, TD 3,870 ft., elev. 3,062 ft., Delaware sand 3,771 ft.

Martin County: Wiggins-Hyde-Cascade 1 E. M. Schoenecker, 32-38-1N-T&P, dry, TD 237 ft.

Menard County: B. R. Sheffield and Dakota-Texas Co. 1 Earl Reeder, Sec. 7, TTRR Sur., dry, TD 2,247 ft.

Midland County: Ralph Lowe 1 Inez G. Fasken, 6-39-2S-T&P, dry, TD 11,248 ft., elev. 2,835 ft., Spraberry 7,920 ft., Pennsylvanian 10,452 ft.

Pecos County: Woodley Petroleum Co. et al 1 C. J. Golden Estate "40," 40-10-H&GN, dry, TD 1,890 ft.

Reeves County: J. J. Gerhardt 1 P. B. Wilson, 48-58-2S-T&P, dry, TD 3,003 ft., Delaware lime 2,604 ft., sand 2,646 ft.

Runnels County: John K. Dorance 1 Clara Schoenfield, W. W. Welch Sur., 2½ mi. W Miles, dry, TD 5,280 ft., elev. 183 ft., Morris sand 4,184 ft., Ellenburger 5,060 ft.

Tom Green County: Hiawatha Oil & Gas Co. 1 H. H. Ripple, 61-11-SPRR, dry, TD 6,500 ft., elev. 1,888 ft., Strawn 4,552 ft.

SOUTHEAST NEW MEXICO

HOBBS.—Amerada Petroleum Corp. has staked location for a 10,000-ft. wildcat 8 miles west of the Bagley field in northwest Lea County. It is the 1-A EC State in 6-12s-32e.

Tide Water Associated Oil Co. has made location for a 7,500-ft. wildcat, calculated to reach the pre-Cambrian, in Northwest Roosevelt County. It is the 1 Grady Best, in 27-2s-29e.

Skelly Oil Co. 1 Mexico-State "J," 32-24s-38e, has indicated production in the Clear Fork. Drill-stem test from 6,405-80 ft., open 4 hours, had gas in 16 minutes and recovered 1,260 ft. of oil, plus oil and gas-cut mud. Second test from 6,733-6,875 ft., open 3 hours, had gas in 38 minutes and recovered 300 ft. of gas-cut mud, plus 300 ft. of heavily oil-cut mud, estimated to be 40 per cent oil.

At last report, drill-stem test in the Devonian topped at 7,543 ft., produced the water blanket and 300 ft. of slightly oil and gas-cut mud.

Skelly staked location for a 1-mile north offset to the above well, as the 1-K Mexico, in the SE SE 29-24s-38e, and scheduled to 7,500 ft.

Skelly also staked location for a 12,500-ft. test as the 1 Stanbro Heirs, in 4-15s-37e, west of the Denton Devonian field.

SOUTHEAST NEW MEXICO WILDCAT FAILURES

Eddy County: Continental Oil Co. 1 W. P. Thurman, 11-16s-27e, dry, TD 10,700 ft., elev. 3,668 ft., Pennsylvanian 6,742 ft., Mississippian 9,005 ft., Devonian 9,547 ft., Simpson 10,225 ft., Ellenburger 10,295 ft., granite wash 10,735 ft.

Quay County: I. A. Stephens 1 W. C. Lee, 32-6n-30e, dry, TD 6,506 ft. in granite wash, San Andres 2,408 ft., Abo 5,100 ft.

Roosevelt County: Mid-Continent Petroleum Corp. 1 Strickland, 9-4s-35e, dry, TD 7,606 ft., elev. 4,280 ft., San Andres 3,134 ft., Glorietta 4,190 ft., Yeso 4,390 ft., Abo 6,450 ft., Permo-Pennsylvanian 7,240 ft., igneous 7,570 ft.

TEXAS PANHANDLE (DISTRICT 10) WILDCAT FAILURES

Collingsworth County: Superior Oil Co. 85-75 Brown, 75-22-H&GN, 11 mi. N Quail, dry, TD 5,710 ft.

Oldham County: Superior Oil Co. 54-9 Gray, 9-F-GC&SF, 4 mi. N Wildorado, dry, TD 7,216 ft.

Kansas

Arbuckle Lime Produces In Ellis County Wildcat

SOUTHEASTERN Ellis County has an indicated new pool in the area 4 miles southwest of the Toulon pool where a wildcat drilled by Lion Oil Co. produced at the rate of 18 bbl. of oil per hour in a swabbing test of Arbuckle lime. The prospective well, 1 Herl, NW NW SE 28-14-17, is bottomed at 3,488 ft. with top of the pay at 3,474 ft. Hole is open below 3,476 ft. Formation was opened with 3,000 gal. of acid.

In Barton County, Todd Drilling Co. and Derby Oil Co. have another promising discovery 3 miles northwest of Hoisington where their 1 Sanford, SW NW NW 25-17-14, swabbed at the rate of 20 bbl. of oil per hour from Arbuckle lime, topped at 3,373 ft. (—1,478 ft.). Total depth is 3,394 ft. A total of 1,000 gal. of acid was used. Location is about 2 miles east of the Carroll pool, nearest production.

Anschutz Drilling Co. 1 Sittner, SE NE SW 4-22-12, northern Stafford County wildcat, swabbed 15½ bbl. of oil in the first 30 minutes while cleaning out following application of 500 gal. of acid. Prior to acidizing it swabbed 5 bbl. of oil per hour. Pay zone is Arbuckle lime, topped at 3,647 ft. (—7,782 ft.) and drilled to 3,650 ft. Casing is at 3,648 ft. Location is only ¾ mile west of the Max pool, but is separated from production by dry holes. The Drach pool to the southwest also is separated by dry holes.

Another Stafford County wildcat, located 2 miles southwest of the Lincoln pool, near the west edge of the county, has found promising oil showings in the Lansing-Kansas City lime section, but at last report was drilling ahead with bottom in Viola lime. It is Westgate-Greenland Oil Co. 1 Russell, SE SE NW 6-22-14. Lansing was cut at 3,476 ft. (—1,515 ft.). A drill-stem test at 3,588-94 ft. recovered 60 ft. of heavily oil and gas-cut mud with tester open 60 minutes. A test of a lower zone at 3,609-31 ft. yielded 120 ft. of oil-cut mud. Deepening, the Conglomerate was topped at 3,757 ft. and the Viola at 3,767 ft.

Rine Drilling Co. is preparing to test oil showings found in the Conglomerate zone at its 1 Madden, NW NW NE 17-14-21, eastern Trego County. A drill-stem test at 3,897-3,939 ft. with top of the Conglomerate at 3,909 ft. yielded 120 ft. of oil-cut mud. Since then, the hole has been drilled to 4,351 ft. in Arbuckle, topped at 3,997 ft. Casing was run to 4,064 ft. Location is 5 miles south of the Riga pool.

KANSAS SUCCESSFUL WILDCATS

Stafford County: Duke & Wood 1 Christianson, NW SW NW 10-21s-12w, pumped 42 bbl. oil from Arbuckle at 3,503-06 ft., TD.

Omega 1 Fischer, CEL NW NE 8-21s-13w, pumped 25 bbl. oil from Lansing at 3,513-15 ft., TD 3,625 ft., OWWO, was producing from Arbuckle topped at 3,589 ft.

KANSAS WILDCAT FAILURES

Barton County: Hilton & Lotus Oil 1 Jenisch, SW SW NW 33-17s-12w, dry, TD 3,423 ft.

Cowley County: Adair 1 Joy, NE NE SE 10-30s-3e, dry, TD 2,372 ft.

Wiedemann 1 Feaster, SE NE NE 36-32s-5e, dry, TD 3,109 ft.

Ellis County: Peel-Hardman 1 Kuhn, NE NE NE 2-14s-17w, dry, TD 3,665 ft.

Kingman County: Smitherman & Cohen 1 Young, NW NW SW 33-27s-5w, dry, TD 3,848 ft.

McPherson County: B & R 1 Schafer, NE NE SW 29-18s-1w, dry, TD 2,924 ft.

Phillips County: Westgate-Greenland 1 Shaw, NW NW SE 18-4s-18w, dry, TD 3,619 ft.

Laura Jane 1 Keeten, SW SW SW 17-5s-17w, dry, TD 3,576 ft.

Pratt County: Flynn 1 Lee, SW SW NE 29-29s-13w, dry, TD 4,807 ft.

Rice County: Dozier 1 Willems, SE NE SW 14-18s-8w, dry, TD 3,284 ft.

Rooks County: Deep Rock 1 Normandin, NW NW NW 20-8s-20w, dry, TD 3,700 ft.

Lewis 1 Hilgers, SE SE SW 5-9s-18w, dry, TD 3,548 ft.

Rush County: GMR 1 Ochs, NE NE SE 8-17s-16w, dry, TD 3,651 ft.

Stafford County: Lauck 1 Malone, SW SW SE 1-21s-11w, dry, TD 3,410 ft.

Sumner County: Alpine 1 Herod, NE SW NE 10-33s-2e, dry, TD 3,515 ft.

Trego County: Nye 1 Brown, SW SW SE 14-11s-22w, dry, TD 3,952 ft.

Yockey 1 Christopher, NE NE NW 12-12s-21w, dry, TD 4,023 ft.

Wabaunsee County: Woods 1 Munzer, NW SW NW 13-13s-9e, dry, TD 3,436 ft.

EASTERN NEBRASKA WILDCAT FAILURE

Harlan County: B & R 1 Burns, NE NE NE 34-2n-18w, dry, TD 3,557 ft.

Eastern Texas

Woodlawn Gas-Distillate Field Extended Northward

DALLAS. — The Woodlawn gas-distillate field of Harrison County had a 3-mile north extension, or new discovery, in prospect at Natchez Production Co. and Hollandsworth Oil Co. 1 Key, in the William Mason Survey.

Final tests had not been made at last report, but operators moved the rig off to complete. The well had shown for production from both the upper and lower Pettit at 6,404-30 and 6,450-96 ft. Flowing pressures were around 2,200 psi. from both intervals.

Sinclair Oil & Gas Co. 1 Barnes, Grayson County test, recovered 190 bbl. of oil in 24 hours of swabbing.

Mid-Continent Petroleum Corp. and Skelly Oil Co. 1-D Chiles, northwest of Pottsboro, was drilling in shale at 8,045 ft.

Mid-Continent 1 Carson, extension test in the Sandusky area, was swabbing 4 bbl. of oil an hour on perforations from 7,748-78 ft.

The Texar Co. 2 Barnes, semiwildcat in

the Stickney Survey, was drilling shale and lime at 7,116 ft.

L. O. McMillan 1 Fay Price, confirmation well to the discovery north of Sandusky, has been completed for 380 bbl. of oil a day, flowing through 3/16-in. choke. Pay sand was from 8,218-46 ft.

EAST TEXAS (DISTRICTS 5 AND 6) WILDCAT FAILURES

Kaufman County: Cities Service Oil Co. 1 E. M. Watkins, E. Higdon Sur., ½ mi. SE Kemp, dry, TD 6,260 ft., Woodbine 2,953 ft., upper Glen Rose 4,685 ft., Comanche 5,390 ft.

Rusk County: Humble Oil & Refining Co. 1 Southern Pine, J. H. Hyde Sur., 2 mi. NE Cushing, dry, TD 8,125 ft., elev. 361 ft., Austin chalk 3,455 ft.

Southwest Texas

Pumps Being Installed on New Carrizo Discovery

CORPUS CHRISTI. — Henderson Coquat and O. R. Mitchell are installing equipment at 1 Carlos Pena, new Carrizo sand oil-field discovery in northwestern LaSalle County. Operators swabbed 25 bbl. of fluid per day from the well, being 80 per cent oil and 20 per cent wash water. Production is from perforations at 2,214-18 ft. Hole is bottomed at 5,737 ft. and operators ran electric log to that depth and failed to indicate showings in the Navarro. However, oil saturation was indicated in the Carrizo sand, so operators plugged back and set 7-in. casing to 2,220 ft. for completion.

Completion of this well may set off a new trend of shallow exploration in the Carrizo zone across southeastern Frio, northwestern LaSalle, and Central Atascosa counties. The new discovery is located in the east corner of I&GN Survey 19, Block 2, A-897.

Three and one-half miles north-northeast of Northeast Jones field, in Jim Hogg County, Sun Oil Co. has completed 29 A. C. Jones for a new oil-field discovery. The well flowed 127 bbl. of 43.7°-gravity oil daily through perforations at 4,943½-47½ ft. Gage was made through 5/32-in. choke. Tubing pressure was 650 psi. and casing pressure 1,125 psi. The new discovery is in the Auga Nueva de Arriba Grant, Abstract 257.

Seaboard Oil Co. of Delaware is preparing to perforate for testing after running 5½-in. casing in 1 L. Armour Hinnant, wildcat in Las Animas Grant in Jim Hogg County. The well is bottomed at 3,469 ft. and cased to 2,163 ft. Operators will perforate 2,117-17 ft. to test sands that had slight odor when coring.

A new gas discovery for Nueces County is Panhandle Producing & Refining Co. 1 Knolle Farms, located 10 miles north of Auga Dulce near the Jim Wells County line. The well flowed gas on 30-minute drill-stem test conducted at 5,162-72 ft. using ¼-in. chokes. On latest gage, the well made 50,000,000 cu. ft. of gas daily plus 1 bbl. of condensate per million. The new discovery is located in Share 9, Bluntzer Partition.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCATS

Aransas County: Gas discovery — Western Natural Gas Co. 13 St. Charles Ranch Co., I. Dowess Sur., A-53, TD 11,275 ft., perf. 10,320-60 ft., IP: 86,000,000 cu. ft. of gas per day, open flow.

Atascosa County: Oil discovery — C. C. Dauchy & Miller Roy Co. 1 Jane Burns, Francis Oerelling Sur. 1336, A-654, TD 3,567 ft., Navarro 3,550-67 ft., IP: 35 bbl. oil per day, 40° gravity.

Jim Hogg County: Oil discovery—Sun Oil Co. 29 A. C. Jones, Agua Nueva de Arriba Gr., A-257, TD 4,997 ft., perf. 4,943-47 ft., IP: 127 bbl. oil per day, 5/62-in. choke, 43.7° gravity.

Jim Wells County: New pay at Lou Ella—Daubert & Achning 6 Lou Ella Wade, Lot 1, Great Block 5, Casa Blanca Gr., A-296, TD 5,128 ft., Stillwell 5,111-17 ft., IP: 57,000,000 cu. ft. of gas per day, dual completion, will also be completed in regular oil-field pay.

Gas discovery — Arnold O. Morgan 1 Charles Hoelscher, Share 5-A, Los Presenos de Abajo Gr., TD 3,690 ft., perf. 3,630-34 ft., IP: shut in gas well, no gage.

Gas discovery—W. Earl Rowe, et al, 1 R. V. Embleton, "Los Presenos de Arriba" Gr., Block 10 of Al Smith Farm Subd., TD 3,520 ft., perf. 3,402-08 ft., IP: 9,800,000 cu. ft. of gas per day, open flow.

Nueces County: Gas discovery—Forest Oil Corp. 1 May Dunn Wagner, Lot 17, Sec. 40, Flour Bluff & Encinal Farm & Garden Tracts, TD 7,005 ft., perf. 6,629-35 ft., IP: 17,200,000 cu. ft. gas per day.

Starr County: Gas discovery—Chicago Corp. 1 Bessie H. Cooke, El Javali Gr., TD 2,510 ft., perf. 2,223-27 ft., IP: 8,200,000 cu. ft. of gas per day, open flow.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Aransas County: F. William Carr 1 T. P. McCampbell, Estate, Block 19, McCampbell Subd. of James McKay Sur., A-160, dry, TD 8,420 ft.

Duval County: Argo Oil Corp. E-1 J. E. Murphy Estate, BS&F Sur. 112, A-1592, dry, TD 3,211 ft.

Gorman & DeLange 1 H. P. Drought, Sec. 162, Juan L. Saen Sur., dry, TD 3,160 ft.

W. D. Kennard-Ralph & Dale Rowden 1 DCRR Sur. 56, dry, TD 2,208 ft.

Fred W. Shield 1 Alfred R. Hubberd, BS&F Sur. 79, A-89, dry, TD 3,265 ft.

Taylor Refining Co. T-1 Parr, BS&F Sur., A-86, dry, TD 5,000 ft.

Taylor Refining Co. T-2 Parr, BS&F Sur. 299, A-86, dry, TD 4,301 ft.

The Texas Co. 1 Mauricio Saenz, "La Huerta" Gr., J. A. Gonzales Heirs Sur., A-227, dry, TD 5,227 ft.

Hidalgo County: Morris Cannan 1 Mary Reitzel, Sec. 6, League 2 of G. O. Newman's Subd. of Hidalgo CSL Sur., dry, TD 8,019 ft.

Sinclair Oil & Gas Co. 2 Fred Krenmueller Unit, Lot 16, Sec. 12, Alamo Land & Sugar Co. Subd., dry, TD 8,871 ft.

Jim Hogg County: F. P. Zoch, Jr., 1 San Juan Ramirez, Tagel Subd., Williams Sur. 271, dry, TD 2,004 ft.

Jim Wells County: F. William Carr 1 W. E. Taylor, Share 2 of Share 7 Parcel "A" Los Presenos de Abajo Gr., dry, TD 5,710 ft.

LaSalle County: Seaboard Oil Co. of Delaware 1 St. Louis Union Trust Co., GB-&CNG Sur. 1, A-867, dry, TD 7,207 ft.

Nueces County: The Chicago Corp. 1 Albert Discher Estate, Lot 20, George H. Paul 100-ac. tract, Subd. of Driscoll Ranch, dry, TD 8,505 ft.

Miami Operating Co. 1 Fred Quebe, R. King Farm Lots, dry, TD 5,918 ft.

Curtis Singleton & Pontiac Refining Co. 1 E. D. True, Sec. F, F. Z. Bishop Subd. of Share Z, dry, TD 7,911 ft.

San Patricio County: Phillips Petroleum Co. 1 Key, John Smith Sur., A-234, dry, TD 11,000 ft.

Rock Hill Oil Co., et al, 1 J. P. Williams, Lot 8, Sec. 23, 3rd Addition to Taft Farm Lands, dry, TD 7,491 ft.

Starr County: Clark Fuel Producing Co. 1 M. G. Salinas, Porc. 111, A-98, dry, TD 3,015 ft.

Dan L. Clark & Rupert Cox, et al, 1 D. R. Semmes, Porc. 88 and 89, dry, TD 2,708 ft.

Clark Fuel Producing Co. 1 Jose R. Salinas, J. A. Guajardo Porc. 111, A-98, dry, TD 2,490 ft.

Webb County: Gasoline Production Corp., et al, 1 Moos-State, et al, N. A. Baker Sur. 118, A-2813, dry, TD 2,929 ft.

Killam & Hurd, Inc., 1 Oran G. Kirkpatrick, CCSD&RGNG RR Sur. 32, dry, TD 3,020 ft.

Magnolia Petroleum Co. 2 Thos. Hetherington, Seale, Morris and Seale Sur. 491, dry, TD 1,124 ft.

Canadian Fields

Second Drill-Stem Test Run at Bonnyville Well

CALGARY.—Tor American Oils, Ltd., ran a second drill-stem test at its Bonnyville area well which struck a flow of natural gas of nearly 2,000,000 cu. ft. daily during an earlier test this week. The latter test gave recoveries of some oil and oil-cut mud. Coring and testing is being continued.

The well, Tor-American 1 Bonnyville, in LSD 11, 31-60-5w4, is rated as a 2-mile southward extension to Bonnyville gas area of east central Alberta, being that distance from current Bonnyville gas wells. The latest test, run from 1,168-78 ft., gave a recovery of 50 ft. of oil and 50 ft. of oil-cut mud. Length of test was unspecified, and there was an unmeasured flow of natural gas. The previous test, 88 minutes in duration, was run from 1,132-52 ft., with maximum natural-gas flow rate reaching 1,926,000 cu. ft. daily in 20 minutes, and remaining constant at that rate during the balance of test. The Bonnyville well, located 115 miles northeast of Edmonton, made its gas strike and oil show in the Colony sand.

Pan Western Oils, Ltd., and Western Homestead Oil Co., Ltd., rated another substantial gas well at their Baxter Lake project in east central Alberta, 1½ miles east of the initial gas strike. The Baxter Lake development, located on a 6,781-acre spread, is some 130 miles northeast of Calgary.

The new extension success, Pan Western-Homestead 2 Baxter Lake in LSD 4, 4-47-5w4, ran its test in the Colony sand interval 1,977-95 ft. Maximum natural-gas flow rate was 5,000,000 cu. ft. daily, similar to the original gas strike. Crew has carried hole to 2,120 ft., and will run string of casing and test the Wainwright sand prior to completion as a gas well.

An Imperial Oil, Ltd., well in the Morinville area of central Alberta, about 20 miles north of Edmonton that discovered oil and gas in the Viking sand, has been completed and capped as a gas well. The well, Imperial 3 Morinville, indicated good possibilities of commercial production of crude oil from the Viking, but did not test the zone after hole was completed. The results at No. 3 well will likely spur further exploratory drilling in that area.

First test in the Viking at Morinville 3 was run from 2,771-81 ft., with gas to the surface in 2 minutes, at maximum rate 115,000 cu. ft. daily. When pipe was pulled it cleared some oil, but yielded a fluid column consisting of 2,150 ft. of gassy oil and 60 ft. of gas and oil-cut salt water. Gravity of the oil was 29.2° A.P.I. Latest tests lower in the Viking gave varying amounts of gassy oil and salt water.

Site of Morinville 3 is LSD 6, 32-56-24w4, about 4 miles northwest of Excelsior D2 Devonian oil field and 22 miles west of Redwarter D3 oil field.

The Barons-Monarch Oils No. 1 stepout test in the Barons area of southwest Alberta has found oil encouragement in the Barons sand section and will run further test during the week end to determine commercial possibilities. The well is located in LSD 12, 14-12-23w4, ½ mile due east of the Barons Oil, Ltd., discovery well.

The Barons-Monarch well topped pay sand at 4,079 ft., and obtained about 14 in. of porous oil-bearing sand before finding dense formation. A 70-minute drill-stem test was run of the interval 4,067-4,117 ft., and yielded pipe recoveries of 221 ft. of clean oil. At the 4,061-ft. level about 8 in. of sand were cored showing porosity and oil staining. The crew is now reaming out rathole preparatory to a test of the full section from about 4,061 ft. to present bottom. Results of this test should be obtained during the week end.

CANADIAN UNSUCCESSFUL WILDCATS

Hudson's Bay-Sparky 5, LSD 4, 7-29-4w4, dry, TD 2,649 ft.

Canadian Delhi-Comrey 1, LSD 6, 17-3-7w4, dry, TD 3,193 ft.

Smith-C.P.R. 1, LSD 6, 4-20-15w4, dry, TD 6,064 ft.

North Central Texas

Two Mississippian Wells Discovered During Week

WICHITA FALLS.—The week's completions listed two good Mississippian discoveries, in Archer and Young counties.

Reno Oil Co. and C. L. McMahon 1 Robinson-Pemeta, Mississippian test 2 miles north of the town of Jean, Young County, flowed 124 bbl. of oil a day through ½-in. choke, from pay at 5,028-38 ft.

In Archer County, L. T. Burns 1-A First National Bank of Olney, 6 miles northeast of Megargel, rated a daily potential of 549 bbl. of 44°-gravity oil a day, based on a 6-hour flow of more than 137 bbl. of oil. Production was from open hole at 5,250-5,324 ft.

Sun Oil Co. had prospect of another deep well in Nolan County, 10 miles south of Sweetwater, at its 2 Featherstone, ½ mile north of a recent discovery. The new test recovered 140 ft. of oil and 120 ft. of oil-cut mud on a 2-hour test from 6,902-17 ft., and 70 ft. of oil plus 95 ft. of heavily oil and gas-cut mud on test from 6,905-23 ft.

A new operation in Nolan County was announced by Seaboard Oil Co., as its 1 T. N. Beauchamp. The 7,000-ft. wildcat was located 7 miles northeast of Blackwell in 28-Z-T&P Survey.

Seaboard also staked location for a 7,000-ft. well south of the Double Mountain reef pool of Stonewall County. The latter test is the 1 Alton P. Kennedy in 297-2-H&TC Survey.

In Wise County, Akin & Dimock 1 J. P. Mann was dry at 6,015 ft. Last reported drill-stem test at 5,972-6,015 ft. made an estimated 200,000 cu. ft. of gas and recovered mud and salt water.

In the Richardson area of southern Montague County, Continental Oil Co. 2 H. G. Mann was completed, flowing 936 bbl. of 42°-gravity oil a day through ½-in. tubing choke. Pay was from 5,964-6,011 ft., total depth.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Clay County: L. T. Burns 1 S. F. Phillips, Orange CSL, 3½ mi. NE Bluegrove, TD 6,464 ft., Ellenburger 6,300 ft., perforated 6,320-32 ft., IP flowed 180 bbl. 45°-gravity oil in 8 hr., 24/64-in. choke, TP 190 psi.

Frank Wood 1 J. S. G. Chapin, Byers Subd., 4 mi. SE Charlie, TD 1,156 ft., IP pumped 5.8 bbl. 39°-gravity oil a day.

Eastland County: Wilcox Investment Co. 1 B. C. McElreath, 104-3-H&TC, 5 mi. SW Cisco, TD 2,266 ft., pay 2,258 ft., IP pumped 19 bbl. 40°-gravity oil a day.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: R. W. Darden 1-A R. Harmel, W. E. Probert Sur., dry, TD 1,960 ft.

Reno, Anderson & Prichard 1 Sikes, 12-30-ATNCL, dry, TD 4,494 ft.

Brown County: McLean-Roberts 1-C Cox & McInnis, Osborne Dalton Sur., dry, TD 1,458 ft., elev. 1,481 ft., Capps 380 ft.

McLean-Roberts 1-D Cox & McInnis, SA-&MG. Sur., dry, TD 1,250 ft., elev. 1,532 ft., Capps 535 ft.

Callahan County: Fowler Farm Oil Corp. 1 Fred Hart, Sec. 7, D&DAL Sur., dry, TD 2,205 ft., elev. 1,449 ft., Palo Pinto 1,500 ft.

Clay County: Jack Grace Production Co. 1 Star, Blk. 28, Parker CSL, dry, TD 1,800 ft.

Coleman County: Richard King 1 H. E. Evans, Blk. 1, GH&H Sur., dry, TD 3,611 ft., elev. 1,985 ft., Morris 3,127 ft., Caddo 3,606 ft.

C. T. McLaughlin 1 Mrs. Molly Cochran, 495-25-J. A. H. Cleveland Sur. 495, dry, TD 2,250 ft., Fry 1,434 ft., Marble Falls 2,160 ft.

A. Z. Skeeters 1 Earl Davis, Sec. 14, W. R. Brown Sur., dry, TD 3,812 ft., elev. 2,044 ft., Capps 3,474 ft., Gardner 3,766 ft.

Denton County: Empire Drilling Co. 1-A E. E. Sherrill, H. Irwin Sur., A-650, dry, TD 1,797 ft.

W. D. Lewis & Jess Cress 1 W. H. Newton, Berlson, Coke and Johnson Sur., dry, TD 2,500 ft.

Eastland County: Bankline Oil Co. et al 1-A G. P. Fee, 75-4-H&TC, dry, TD 3,800 ft., elev. 1,556 ft., Strawn sand 1,850 ft., Lake sand 3,453 ft., Marble Falls 3,534 ft.

Wallace Harrison 1 R. A. Madden, S. J. Robinson Sur., dry, TD 2,008 ft.

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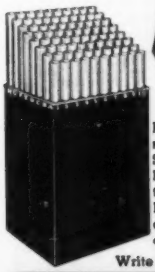

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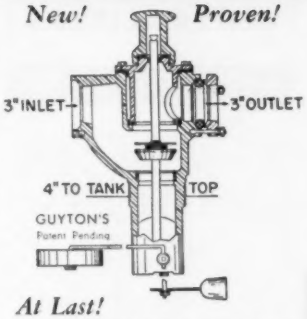

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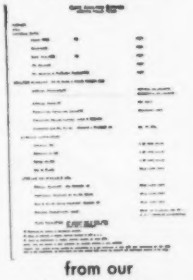

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S. D. Johnson 1 Cora Davis, 3-6 ETRR, dry, TD 3,200 ft.

J. W. Jones 1 H. Z. Matthews, Lot 5, Nancy Ussury Sur., dry, TD 1,446 ft.

Tompkins & Fletcher 1 Nancy Blackwell, 19-2-McLennan CSL, dry, TD 3,757 ft., elev. 1,377 ft., Ellenburger 3,668 ft.

Jones County: Great Lakes Carbon Co. 1 R. L. Watts, Sec. 51, Deaf & Dumb Asylum Lands, dry, TD 3,703 ft., elev. 1,635 ft., Flippen 2,270 ft., Canyon sand 3,580 ft.

Hooker & DeMohrenschildt 1 Mrs. M. E. Glazner, 50-2-SPRR, dry, TD 2,751 ft., elev. 1,758 ft., Flippen sand 2,500-35 ft., lime 2,540 ft., Hope lime 2,681 ft.

Montague County: An-Son Petroleum Corp. 1 J. R. Johnson, John Short Sur., A-664, dry, TD 4,541 ft.

Nolan County: Hanley Co. 1 A. L. Jaggers, 204-64-H&TC, dry, TD 5,715 ft., elev. 2,196 ft., Flippen 3,304 ft., reef 4,283 ft., Marble Falls 5,663 ft.

Palo Pinto County: J. B. Clardy 1 Allen & Ritchie, Sec. 1, SPRR Sur., dry, TD 1,867 ft.

Stephens County: J. W. Baldwin 1 R. F. Ledbetter, 81-6-T&P, dry, TD 2,015 ft.

Dallas Consumers Petroleum Corp. 1 Link, 39-4-T&P, dry, TD 3,755 ft., Caddo 3,276 ft.

E. C. Johnson Co. 1 F. M. Sullivan, 18-6-T&P, dry, TD 1,885 ft.

Stonewall County: American Liberty Oil Co. 1 Tatum, W. M. Smith Sur., dry, TD 6,138 ft., Caddo 5,722 ft.

Throckmorton County: Brown Drilling Co. Co. 1 R. A. Brown, Sec. 1,608, TE&L Sur., dry, TD 4,846 ft., Caddo 4,183 ft., Mississippian 4,793 ft.

Young County: W. B. Hamilton 1 J. M. Hall, TE&L Sur., 1,998 ft., A-1,072 ft., dry, TD 3,500 ft

Mississippi

Prospective Wilcox Well Runs Into Difficulties

JACKSON.—Dave Gammill - Lyle Cashion Co. 1 D. F. Anderson, 3-5n-1e, prospective Wilcox discovery in southwestern Franklin County, Mississippi, has encountered completion difficulties. Operators perforated at 6,260-64 ft. and swabbed oil and a small amount of wash water. Salt water broke in and perforations had to be squeezed off. Cement was drilled out to 6,267 ft. and operators perforated at 6,265½-66½ ft. opposite too foot of permeable sand. The well started to flow and had to be shut in. Casing pressure was reported at 125 psi. Operators made several attempts to kill the well, but were unsuccessful. It is reported that the well will be tested through the casing.

In the Russum area of Claiborne County, the closely watched Dorris Ballew, Inc., et al, 1 J. Davenport-H. King Estate Unit, 68-11n-2e, cored the lower part of the Upper Tuscaloosa at 9,409-39 ft. with no shows noted. Recovery was salt-water sand, shaly sand, and shale. Coring was resumed at 9,696 ft. and at last report, 40 ft. of shale had been recovered down to 9,736 ft. It was reported that a break had been encountered while cutting a core at 9,736-41 ft., but no details have been released.

In Jones County, Mississippi, approximately 6 miles east and 2 miles south of Ellisville, Gulf Refining Co. 1 Masonite Corp. "H," 15-7n-11w, has been abandoned at total depth of 8,716 ft. with no shows encountered.

MISSISSIPPI WILDCAT FAILURES

Jefferson County: Gulf Refining Co. 1 Jefferson County "E," 18-9n-1e, dry, TD 7,002 ft.

Jones County: Gulf Refining Co. 1 Masonite Corp. "H," 15-7n-11w, dry, TD 8,707 ft.

Washington County: C. H. Murphy & Co. 1 Branton, 23-16n-8w, dry, TD 4,253 ft.

South Louisiana

Humble Opens Condensate Production in Lafourche

NEW ORLEANS.—Midway between Golden Meadow and Bay de Chene fields, in Lafourche Parish, Humble Oil & Refining Co. has opened new gas-condensate production at 1 Louisiana Land & Exploration Co. "C," 30-19s-23e. Through perforations at 10,262-66 ft., the well flowed 97 bbl. of 57.1 gravity oil daily through 3/16-in. choke. Tubing pressure was 3,400 psi. This wildcat was drilled to 13,837 ft. and cased with 7-in. pipe to 13,349 ft. Operator plugged back to 10,282 ft. before effecting perforations.

In Washington County, Humble's C-1 Gaylord Container Corp., indicated discovery in 47-1s-14e, is waiting on production test with casing perforated at 9,004-10 ft. Hole is plugged back to 9,013 ft. from total depth of 9,059 ft. after salt water was tested at 9,018-25 ft. On drill-stem test at 8,999-9,004 ft., with tool open 10 minutes, recovery was 160 ft. of gas-cut mud and 30 ft. of condensate. This well is located 2½ miles southeast of production in Sandy Hook field, Marion County, Mississippi.

Sinclair Oil & Gas Co. has abandoned 1 S. N. Garrett, et al, 30-6s-10e, wildcat in the Torbert area of Pointe Coupee Parish. The well was drilled to total depth of 11,003 ft. and electrical survey run before abandoning. Side-wall samples with indicated sand and odor were taken at 8,648-51 ft.

Union Oil Co. of California is building roads to location for an outpost test to Arnaudville field, St. Landry Parish. The venture, 1 J. A. Higginbotham, 47-7s-5e, has a proposed depth of 10,500 ft.

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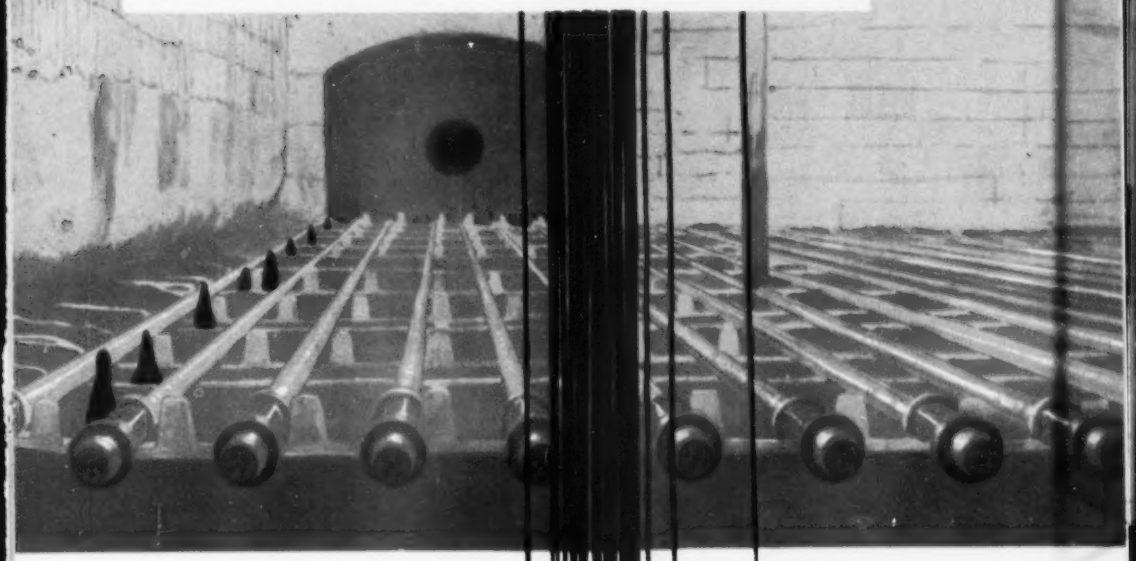

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Shell Oil Co. is still testing its deep venture, 1 H. T. Gonsoulin, 41-14s-7e. On latest gage, the well flowed at the rate of 188 bbl. of 45.5°-gravity oil daily through perforations at 16,572-16,600 ft. If completed at that depth, it will establish the world's deepest producing record.

SOUTH LOUISIANA WILDCAT FAILURES

Plaquemines Parish: Ted Weiner 1 Louisiana Land & Exploration Co., 26-19s-27e, dry, TD 13,025 ft.

St. Landry Parish: Sinclair Oil & Gas Co. 1 Frank M. Bacque, 29-5s-5e, dry, TD 11,700 ft.

Terrebonne Parish: Humble Oil & Refining Co. 1 Louisiana Land & Exploration Co. "B," 13-20s-14e, in Lake Merchant, dry, TD 14,000 ft.

California

Operators Intend Drilling At Increased Tempo

LOS ANGELES.—California operators intend to continue drilling at an increased tempo during the third quarter, according to the forecast prepared last week by the conservation committee. During July the report shows they expect to complete 171 wells, and in August and September activity will be somewhere near this level.

At the midyear point, 1,076 wells had been drilled in California fields, as compared with only 829 in the like period of 1950. Because much of the drilling took place in proved shallow, heavy-oil fields, they were able to register a total of 786 oil wells as compared with 571 oil producers in the first half of 1950.

During the next 3 months the forecast shows that drilling activity will continue to be widely scattered. The Placerita Canyon field is scheduled to receive about 20 wells monthly, and Wilmington may have a similar number. San Joaquin Valley fields, however, are slated to remain the most active, receiving around 70 new wells monthly. At Elk Hills the accelerated program recently started by the Navy is expected to result in about 10 new wells monthly.

A new shallow field discovery was registered ¾ mile southwest of Salt Creek field in Kern County. It was Ferguson & Bosworth 2 Anderson in SW SW 19-29s-21e, completed as a small pumper in the Phacoides at 496 ft. The discovery pumped 30 bbl. daily, cut 30 per cent, of 22°-gravity crude. Top of the Phacoides was called at 453 ft.

Kings County's Pyramid Hills area also had a potential discovery in the making. There, Norris Oil Co. was preparing to complete its 115 "Well," in 28-24s-18e, after a formation test at 852-93 ft. yielded 630 ft. of oily, gas-cut mud and some free oil. Drilled to a total depth of 893 ft., top of the oil sand was called at 856 ft. Gravity of the crude recovered was about 14.5°.

At San Ardo field in the coastal region, where more than six rigs are now at work, Superior Oil Co. was in the process of completing a ¾-mile northeast extension. The stepout was its 6 Orradre in 6-23s-11e. Drilled to 2,821 ft. and plugged back to 2,789 ft., completion was being made in 65 ft. of sand at 2,719-84 ft.

Near Castaic Junction in the Newhall region of Los Angeles County, Southern California Petroleum Corp. was testing an 8,890-8,962-ft. section at its wildcat south of Del Valle and northwest of Newhall-Potrero field. The wildcat, 1 Newhall Land & Farming Co., is located in 20-4n-17w and had been drilled to a total depth of 9,022 ft.

Drilling at two deep wildcats in this region was halted during the week. Southeast of Castaic Junction about 1½ miles, General Exploration Co. abandoned its 1 Newhall Land, in 29-4n-16w, at 12,478 ft. About 2½ miles southeast of the Honor Rancho field, in 9-4-16, Humble Oil & Refining Co. suspended drilling at 8,766 ft. at its D-1 Newhall Land.

Other developments in the Castaic area included staking of a wildcat about 1½ miles southeast of Honor Rancho and the completion of an 800-ft. north stepout to the field. The new wildcat will be Superior Oil Co. 1 Newhall Land in 8-4-16. The extensioner was The Texas Co. 5 Honor Rancho, possibly a 2,000-bbl. producer.

CALIFORNIA UNSUCCESSFUL WILDCATS

Fresno County, Kerman area: Golden Bear Oil Co. 1 Lull, 23-14s-17e, dry, Eocene 5,815 ft., TD 6,292 ft., elev. unreported.

Kern County, Sharktooth area: E. A. Bender Drilling Co. 4 S. P., 23-28s-28e, dry, gray Vedder 2,694 ft., TD 2,719 ft., elev. 827 ft.

Tejon Hills area: J. F. Kosanke K-3-14 "Well," 14-11n-18w, dry, Santa Margarita 420 ft., TD 590 ft., elev. 1,089 ft.

Kings County, Hanford area: Arcady Oil Co. 1 Drummond-Union, 36-18s-22e, dry, TD 5,362 ft., elev. 256 ft.

Los Angeles County, Lancaster area: C. W. Colgrove 46 Schwandt, 23-7n-14w, dry, bottomed in granite, TD 3,153 ft., elev. unreported.

Newhall-Castaic area: General Exploration Co. 1 Newhall Land & Farming, 29-4n-16w, dry, TD 12,478 ft., elev. 1,426 ft.

Orange County, West Newport area: B. A. Thomas & L. B. Baldwin 1 Pocohontas, 13-6s-11w, dry, TD 2,930 ft., elev. 16 ft.

San Luis Obispo County, Cuyama Valley area: J. F. Kosanke 9 Kosanke, 23A-11n-28w, dry, TD 2,135 ft., elev. 1,020 ft.

San Mateo County, San Gregorio area: The Texas Co. 1 Ross, 10-7s-5w, dry, TD 7,111 ft., elev. 340 ft.

Santa Barbara County, Santa Ynez area: The Texas Co. 1 Fulwider, 33-7n-29w, TD 3,486 ft., elev. 1,578 ft.

Solano County, Benicia area: Tide Water Associated Oil Co. 1 Donohue et al, 8-3n-2w, bottomed in Cretaceous shale, TD 2,536 ft., elev. 20 ft.

CALIFORNIA SUCCESSFUL WILDCAT

Kern County, West Edison field, new zone discovery: California Exploration Co., et al 28-4 Porter, 26-30s-29e, flowed 190 bbl. daily cut 8 per cent through perfs. between 3,819 and 4,606 ft., 22.5° gravity, 14/64-in. bean, Chanac oil sand 3,818 ft., Santa Margarita 4,185 ft., TD 4,609 ft., elev. 475 ft.

Michigan

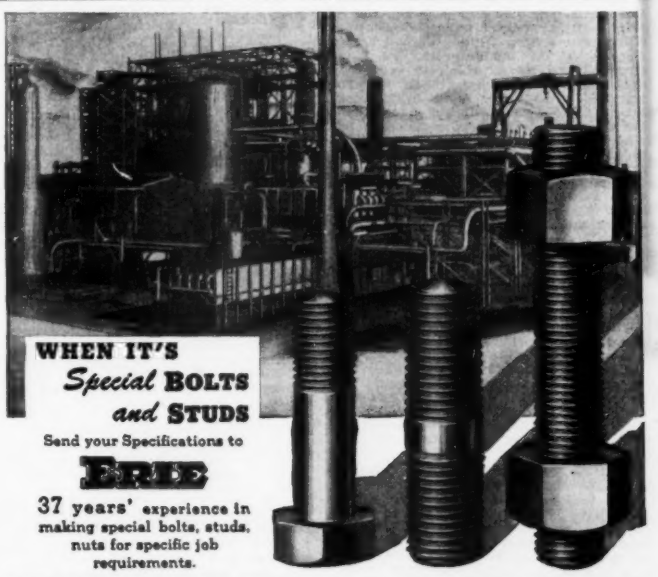
All Zones Dry in Osceola County Offset Venture

MOUNT PLEASANT.—Mogul Oil Co. drilled all zones dry at the 1 Johnson & Forsgren, NE NE SW 20-20n-9w, Sherman Township, Osceola County, the diagonal southwest 20-acre offset to same company's 1 Hammar, which showed for near-commercial completion in the Dundee, but showed water after deepening and acid treatment in that objective.

The 1 Johnson & Forsgren was drilled out dry at 3,963 ft., total depth, after tests of the Traverse, Dundee and Reed City zones failed to show oil saturation. This offset was about 9 ft. lower structurally than the 1 Hammar. Mogul will convert this dry hole for use as a brine-disposal well and will set a pumping unit at the 1 Hammar where production tests will be resumed.

The 1 Hammar has been inactive for several weeks at 3,869 ft., plug-back depth, after salt water showed in quantities after last acid treatment. Prior to deepening and acidization, the 1 Hammar swabbed and flowed as much as 50 bbl. of oil a day over a period of several days.

Mogul also announced this week that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another test well would be started in this Sherman-Osceola play in the near future. Location had been staked and cleared for the diagonal northeast offset to the 1 Hammar, in the NE SW NE 20-20n-9w.

Drilling permits for wells of all classifications issued by the Michigan Department of Conservation during the first half of 1951 totaled 358, compared to 473 new permits written in the first 6 months of 1950.

MICHIGAN WILDCAT FAILURES

Kalkaska County, Clearwater Township: Sun Oil Co. C-1 Miltner estate, NE NE NE 27-26n-5w, dry in Richfield, TD 4,327 ft.

Kent County, Tyrone Township: H. E. Walton and Robert Anderson 1 Clute & Hodgins, NW NW NW 23-10n-12w, Traverse 2,339 ft., dry, TD 2,351 ft.

Newaygo County, Troy Township: M. B. Belden 5 Belden & Fawcett, NE NW NW 34-16n-14w, Traverse 2,168 ft., dry, TD 2,177 ft.

Osceola County, Sherman Township: Mogul Oil Co. 1 Johnson & Forsgren, NE NE SW 20-20n-9w, Reed City zone 3,939 ft., dry, TD 3,963 ft.

Saginaw County, Birch Run Township: Petroleum Development Co. 1 Muhleman, NE NE NW 29-10n-6e, Berea 1,536 ft., dry, TD 1,560 ft.

Illinois-Ind.-Ky.

Marion County Wildcat Shows for Oil Producer

THE west side of the Illinois basin is being returned to the regional spotlight with a prospective oil discovery in Marion County, Illinois. Location is in the SW SE NW 11-1n-3e, about 8 miles southeast of Salem, where Atlas Drilling Co. got a good showing of gas and recovered 500 ft. of clean oil and 330 ft. of oil-cut mud in a drill-stem test at its 1 Edith Sawyer. The test was of saturation found in McClosky lime at 2,714-19 ft. Although an additional 540 ft. of salt water was obtained, a fair well is indicated. After hole was drilled to 2,831 ft., casing was run through the prospective pay zone to 2,760 ft. for production tests. Nearest production is in the small Exchange pool, 4 miles to the south and a little east. The area is about 8 miles east of the Salem pool.

In the more densely developed portion of the basin, in western Wayne County, N. V. and Walter Duncan have uncovered another promising productive area at their 1 Blackburn, NE NE SE 29-1s-5e. Indicated pay zone in this wildcat is the Aux Vases sand, in which saturation was logged at 2,946-56 ft. A 2-hour drill-stem test of this interval yielded 2,100 ft. of clean oil with no indication of water. Gas flowed within 35 minutes after tester was opened. The well, located about 5 miles northwest of Wayne City, is about a mile to the south of production in the Coil pool and about the same distance west of the Keenville area. Casing has been run to 2,946 ft.

Ryan & Sharp are completing their 1 Black, SW NW SW 4-3s-10w, as an oil discovery well in Gibson County, on the Indiana side of the basin. Following acidization (1,000 gal.) of its Aux Vases pay zone, the well pumped at the rate of 70 bbl. a day. Location is about 3 miles northeast of Fort Branch and 2 miles to the north of production in that area.

Extension of production of the Parkersburg Consolidated pool, Richland County, Illinois, about ¾ mile to the east is indicated by results of drill-stem tests in Rosiclare lime at Calvert Drilling, Inc., 1 McVaigh, SW SE NE 16-2n-14w. Best saturation was logged at 3,078-88 ft. In a drill-stem test (open 60 minutes) of an interval at 3,063-79 ft., gas flowed in 3 minutes and clean oil in 51 minutes. Testing slightly lower in the pay at 3,084-96 ft., the well made a gas flow within 51 minutes and obtained 390 ft. of fluid, containing sulfur mud, mud and salt water. Hole was drilled to 3,121 ft. and cased to bottom. The area is about 5 miles southeast of Calhoun.

ILLINOIS SUCCESSFUL WILDCATS

Coles County: Mark Twain Oil Co. 1 Haybrook, NW SE SW 2-13n-7e, IP 20 bbl., Aux Vases 1,770-1,800 ft., TD 1,800 ft.

Hamilton County: Dee Miller 1 H. E. Howard et al, SE SW NE 8-7s-6e, IP 185 bbl., Aux Vases 3,125-33 ft., TD 3,133 ft.

Wayne County: Davis & Johnson 1 Chalcraft, SE SE SE 33-1n-8e, IP 35 bbl., Aux Vases 2,997-3,014 ft., TD 3,018 ft. (extension Mount Erie pool).

ILLINOIS WILDCAT FAILURES

Bond County: J. Barry Finley 1 Kersey, NE SW SW 11-4n-3w, dry, TD 1,480 ft.

T. M. Conrey 1 Hunter, SE SW NE 1-4n-4w, dry, TD 1,147 ft.

Clark County: W. W. Dayton 1 Smith-Cole, SW SE NE 17-11n-10w, dry, TD 2,143 ft.

Clay County: Skiles Oil Corp. 1 Moseley, NE NE NW 36-3n-7e, dry, TD 3,144 ft.

Clinton County: LaGrange Petroleum Co. 1 Huffman, NE SW SE 4-3n-1w, dry, TD 2,984 ft.

E. J. Goldschmidt 1 Mahlandt-Berg, SE NE SE 35-3n-4w, dry, TD 2,398 ft.

Effingham County: Milton Smith 1 Dammerman, NW NW SE 14-8n-4e, dry, TD 2,158 ft.

Hamilton County: W. C. McBride 1 Howard, SW SW NW 9-7s-6e, dry, TD 3,342 ft.

Jefferson County: W. R. and D. Kuykendall 1 Beadle, NE SE NW 20-1s-1e, dry, TD 2,160 ft.

Marion County: The Texas Co. 1 Metcalf, SE NE SE 29-1n-4e, dry, TD 2,946 ft.

Richland County: Calvert Drilling Co., Inc., 1-A Hood, NW SE NE 18-2n-9e, dry, TD 3,093 ft.

Calvert Drilling Co., Inc., 1 Boley, SE SE SE 4-2n-14w, dry, TD 3,158 ft.

White County: Ryan Oil Co. 1 Casebier, SE SW SE 19-3s-10e, dry, TD 3,405 ft.

Ryan & Sharp 1 Endicott et al, NE NW NE 28-3s-10e, dry, TD 3,265 ft.

Ryan & Sharp 1 Hoosier, NW SW NE 6-5s-14w, dry, TD 3,228 ft.

E. T. Robinson 1 Baptist, SW NE NE 27-5s-9e, dry, TD 3,301 ft.

INDIANA WILDCAT FAILURES

Daviess County: D. S. Huddelleston 1 Andis, N½ NE SE NE 4-4n-6w, dry, TD 792 ft.

Posey County: Ed E. Rehm 1 Schulte, NE SE NW 6-7s-12w, dry, TD 1,252 ft.

Slagter Producing Co. 1 Pegram-Showers, SW SW NE 13-4s-12w, dry, TD 2,656 ft.

WESTERN KENTUCKY SUCCESSFUL WILDCAT

Webster County: W. F. Lacy 1 Newton Heirs, SW SE SW SW 20-N-23, IP 53 bbl., Hardinsburg 2,010-20 ft., TD 2,010 ft. (opens new pay zone Bald Knob pool).

EASTERN KENTUCKY

ASHLAND.—In Elliott County Hunter et al are drilling at 760 ft. on 1 Jennie Pennington, wildcat on South Ruin Creek, 1 mile northwest of Sandy Hook, the county seat. Test is in top portion of the Weir sand, the objective pay horizon for this area.

In Big Sandy gas field, Pike County sector, Kentucky West Virginia Gas Co. has completed 5983 Spurlock Damron on Caney Creek for a good well in the Big Lime formation. Big Lime from 1,958 to 2,155 ft., total depth, gaged 1,713,000 cu. ft. of gas daily with rock pressure of 640 lb.

In Big Sinking pool, Lea County, and on Big Sinking Creek Ashland Oil & Refining Co. is drilling at 385 ft. on 269 Eureka Coal & Mineral Co. Well is designed to test the Corniferous formations, the normal pay zone for the area.

Louisiana-Arkansas

New Zone Indicated In Monroe Field

SHREVEPORT.—Travis Peak pay may be established in Monroe field, Ouachita Parish, at Southern Carbon Co. 79 Fee, 21-19n-5e. The new horizon, deeper than other production in the field, yielded a good flow of dry gas on drill-stem test at 4,464-73 ft.

The Smackover proved disappointing in Carter Oil Co. 1 McMertiss School, exploratory test in 29-19s-20w, Columbia County. A drill-stem test run at 10,391-95 ft. recovered 1,365 ft. of mud and 35 ft. of mud cut with salt water. The well is now coring in hard limestone below 10,477 ft.

East Schuler field of Union County got its fourth producing level at Curtis Kinard 2 Burns, NE NE SW 13-18s-17w. The well made 100 bbl. of oil from the Cotton Valley at 7,189-92 ft.

NORTH LOUISIANA SUCCESSFUL WILDCAT

Lincoln Parish: Southwest Gas Producing A-1 Peterson, 965 ft. S and 954 ft. W NEc 25-20n-4w, 192 bbl. oil from Woodruff at 4,961 ft., TD.

NORTH LOUISIANA WILDCAT FAILURES

Bienville Parish: Hurley, Cummings & Lehman 1 Long Bell Lumber Co., C NW NW 28-15n-9w, dry, TD 3,161 ft.

Catahoula Parish: Hunt and Gulf 41 Louisiana Delta Lumber Co., 682 ft. N and 860 ft. E SWc 5-5-5e, dry, TD 6,000 ft.

Concordia Parish: Hunt and Gulf 1 Fisher Lumber "E," 2,012 ft. N and 1,963 ft. E SWc 25-7n-9e, dry, TD 6,995 ft.

Grant Parish: Hurley, Cummings & Lehman 1 Colfac Lumber Co., C NE SW SW 10-8n-5w, dry, TD 4,248 ft.

Jackson Parish: Peterson Drilling et al 1 Trement Lumber Co., C SW NE 27-16n-4e, dry, TD 6,653 ft.

ARKANSAS WILDCAT FAILURES

Bradley County: Burnett Drilling 2 Bradley County Lumber "A," 660 ft. S and 810 ft. W NE SW NE 14-16s-11w, dry, TD 5,020 ft.

Calhoun County: Garland Anthony Oil 1 Higgs, C SW SE 30-13s-15w, dry, TD 2,860 ft.

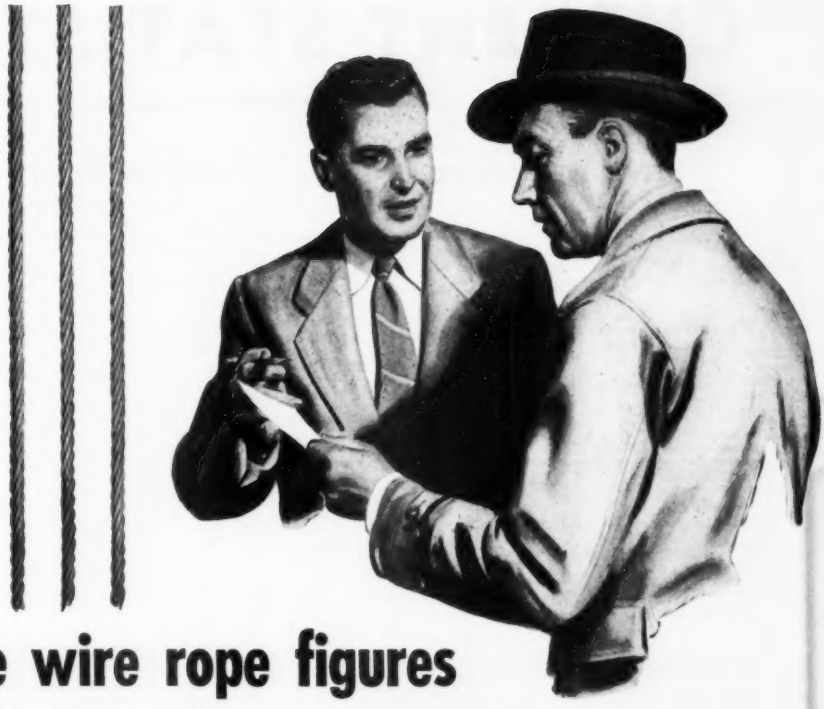
Ouachita County: McAlester Fuel Co. 1 Merritt "A," 430 ft. S and 330 ft. W NE SW SW 14-14s-19w, dry, TD 2,813 ft.

Thomas New Sales Manager For Indian Drilling Mud

Indian Drilling Mud Co., Oklahoma City, announces the appointment of Jeff Thomas as sales manager. Thomas has been active in the Oklahoma City area since 1941 when he joined Black, Sivalls & Bryson.

As sales manager Thomas will cover the entire Mid-Continent area served by Indian Drilling Mud.

A new stocking warehouse has recently been opened at Monte Vista, Colo.



"These wire rope figures really opened our eyes!"

"Couple of years ago, the boss asked me to start checking our wire rope costs. He wanted a little system of records that would tell us what each rope was doing, and how much work we were actually getting from it. Figured we could learn the brand that would last the longest—and cost the least—on our type of work.

"So I started keeping track. In our case, the jobs involving rope boiled down to a matter of tonnages moved. Wasn't at all hard to record what each rope accounted for in its lifetime. When I'd been checking long enough for the figures to have some meaning, I showed 'em to the boss. By then I could tell which make of rope was doing the best job for us, costwise and every way. The figures really opened our eyes!"

These men weren't the first to learn the value of checking rope performance. Many users of Bethlehem wire rope follow the practice regularly. We're always glad to see it, for it enables actual comparisons between brands . . . and we know that in any such comparisons, Bethlehem rope will stand out from the crowd.

Here's a fair suggestion: over a period of time, stack the Bethlehem product against any other brands of your choice. Keep tabs on them all, and at intervals study your figures. Our guess is, those records of yours will prove beyond question the solid economy—the long-term economy—of Bethlehem wire rope.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Export Distributor: Bethlehem Steel Export Corporation

LET YOUR RECORDS TELL YOU!

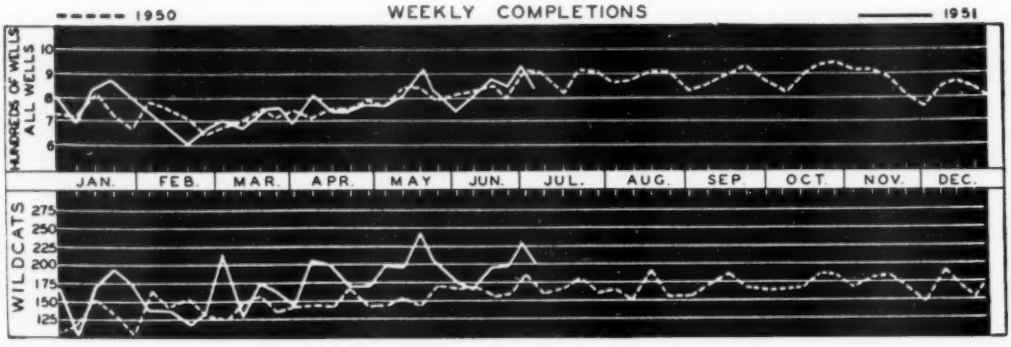
CURRENT STATISTICS

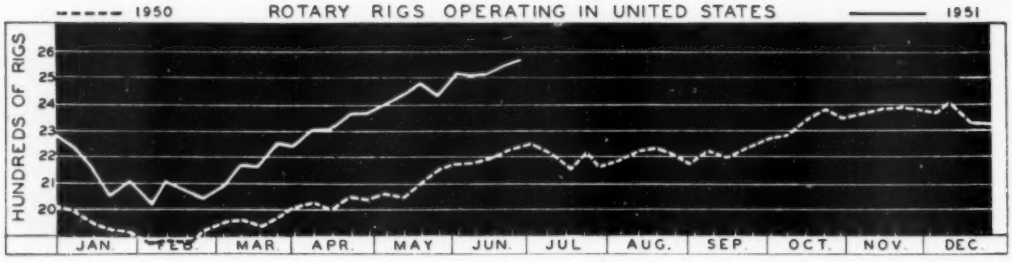
EXPLORATION

WEEKLY WELL COMPLETIONS . . . . . WEEK ENDED JULY 7, 1951

	Total of all wells							Wildcat completions and discoveries									
						July 7—							Cumulative total, 1951—				
	Comp.	Oil	Gas	Dry	Footage	1951	1950	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	11	6	0	*5	15,061	236	247	0	0	0	0	0	0	0	0	0	0
Pennsylvania	11	5	1	†5	20,904	366	481	0	0	0	0	0	0	0	0	1	1
West Virginia	11	1	8	2	39,083	283	331	0	0	1	1	2	0	0	6	4	10
Ohio	25	10	7	18	47,785	445	489	0	0	0	0	0	1	0	4	14	19
Indiana	21	8	1	12	41,016	558	732	0	0	0	3	3	16	0	1	140	157
Kentucky	19	11	0	8	27,866	549	496	1	0	0	0	1	11	0	1	100	112
Illinois	51	27	0	24	133,134	1,025	1,295	3	0	0	16	19	26	0	0	227	253
Michigan	16	3	1	‡12	37,706	374	434	0	0	0	5	5	13	0	6	149	168
Kansas	90	45	14	‡31	289,741	2,185	1,865	2	0	0	18	20	112	0	9	428	549
Nebraska	2	1	0	1	8,252	131	52	0	0	0	1	1	4	0	1	57	62
Oklahoma	89	53	4	‡32	328,309	2,823	2,727	5	0	0	6	11	101	2	15	357	475
Texas	344	175	22	147	1,537,926	8,461	8,258	11	0	6	82	99	369	32	65	1,672	2,138
North Central (Dist. 7-B & 9)	87	33	0	54	271,977	2,587	2,559	3	0	0	29	32	180	2	8	718	908
West (Dist. 7-C & 8)	112	82	1	29	562,400	2,560	2,383	5	0	1	15	21	83	8	5	317	413
Panhandle (Dist. 10)	13	7	2	4	46,043	353	483	0	0	0	2	2	1	0	0	13	14
Eastern (Dist. 5 & 6)	23	18	1	4	101,804	616	600	0	0	0	2	2	4	4	0	112	120
Gulf Coast (Dist. 2 & 3)	46	17	8	21	265,759	1,186	1,149	0	0	0	10	10	53	14	34	241	342
Southwest (Dist. 1 & 4)	63	18	10	35	289,943	1,159	1,084	3	0	5	24	32	48	4	18	271	341
Louisiana	39	23	1	15	270,299	1,034	1,262	1	0	0	8	9	24	3	4	131	162
Northern	23	12	1	10	102,080	536	659	1	0	0	5	6	7	0	3	75	85
Southern	16	11	0	5	168,219	498	603	0	0	0	3	3	17	3	1	56	77
Arkansas	5	1	0	4	19,502	195	200	0	0	0	3	3	8	0	1	38	47
Mississippi	7	3	0	4	41,944	156	172	0	0	0	3	3	6	3	0	57	66
Southeastern States	1	0	0	1	4,525	36	32	0	0	0	0	0	0	0	0	14	14
Montana	2	1	0	1	6,096	108	93	0	0	0	1	1	0	0	0	26	26
Wyoming	23	13	3	7	111,240	356	294	0	0	0	3	3	7	0	0	51	58
Colorado-Utah	8	4	0	4	38,184	132	39	0	0	0	3	3	4	0	3	64	71
New Mexico	11	6	1	4	72,813	336	328	0	0	0	3	3	8	0	7	40	55
California	50	36	1	13	166,403	1,116	879	1	0	0	12	13	23	0	1	221	245
Miscellaneous (Md.)	1	0	0	1	4,323	25	9	0	0	0	1	1	0	0	15	9	24
Total United States	837	432	64	341	3,262,112	20,930	20,717	24	0	7	169	200	733	40	139	3,800	4,712
Total previous week	924	470	69	385	3,618,922			27	2	13	190	232	709	40	132	3,631	4,512
Total July 7, 1950	908	542	46	320	3,354,516			24	1	4	129	158	536	37	106	3,089	3,768

Service wells included: *5, †4, ‡1.





DAILY AVERAGE PRODUCTION FOR WEEK

	July 7 crude oil	B. of M. July demand	June 30 crude oil
Alabama	3,150	2,400	3,150
Arkansas	75,550	85,000	74,300
California	973,900	980,000	968,000
Colorado	73,200	80,000	72,200
Eastern	59,900	64,000	59,000
Florida	1,850	1,600	1,700
Illinois	168,800	162,000	167,800
Indiana	30,400	29,000	30,100
Kansas	305,850	315,000	311,600
Kentucky	29,100	29,000	28,600
Louisiana	610,825	652,000	613,850
North Louisiana	113,250		115,200
South Louisiana	497,575		498,650
Michigan	34,800	42,000	40,600
Mississippi	99,900	104,000	99,300
Montana	23,300	24,000	23,600
Nebraska	6,500	10,000	7,050
New Mexico	147,125	146,000	143,075
Oklahoma	505,000	521,000	506,900
Texas	2,744,750	2,580,000	2,754,175
Dist. 1 (Southwest)	33,050		32,925
Dist. 4 (Southwest)	253,275		258,025
Dist. 2 (Gulf Coast)	160,625		159,750
Dist. 3 (Gulf Coast)	470,825		480,075
Dist. 5 (Eastern)	54,625		53,425
Dist. 6 (Eastern)	115,800		113,950
East Texas	271,300		281,500
Dist. 7-C (West)	101,100		99,325
Dist. 8 (West)	957,000		941,125
Dist. 7-B (W. Central)	81,875		87,075
Dist. 9 (N. Central)	157,750		158,400
Dist. 10 (Panhandle)	87,525		88,600
Utah	3,900	5,000	3,900
Wyoming	195,900	178,000	195,100
Total United States	*6,093,700	6,010,000	6,104,000
Change from prev. week, down	10,300		
Canada	114,050		164,948

Total U. S. production January 1-July 7 †1,111,043,355 bbl.
Same period last year (crude plus cond.) 955,240,515 bbl

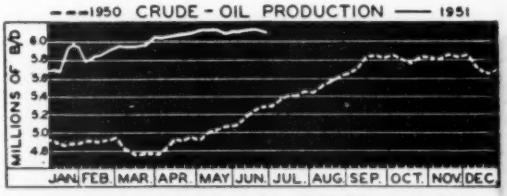
*Not including 101,030 bbl. condensate. †Including 20,042,050 bbl. condensate.

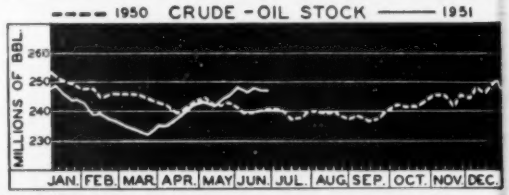
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

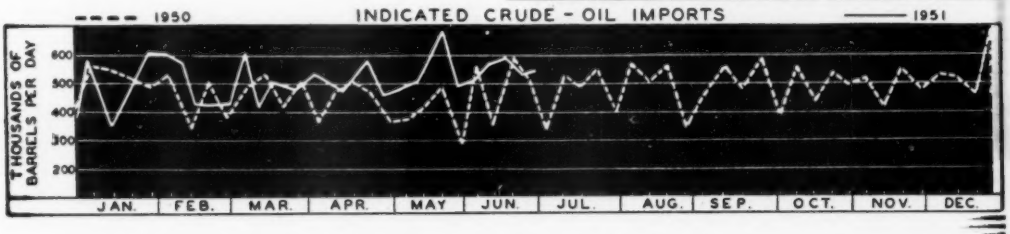
(Thousands of barrels)

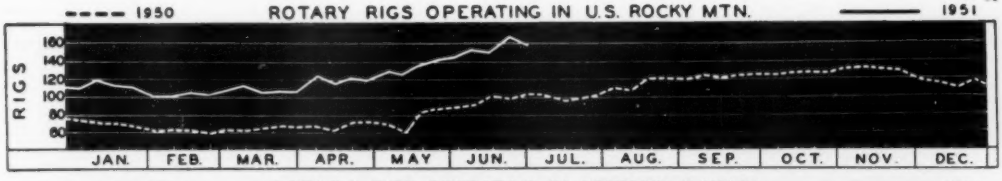
	June 30, 1951	June 23, 1951	July 1, 1950
Pennsylvania Grade	2,090	2,134	2,884
Other Appalachian	1,471	1,528	1,578
Illinois, Indiana, Michigan	11,036	11,274	8,834
Arkansas	2,879	2,929	3,071
Louisiana	14,068	14,499	15,536
North	2,895	2,987	3,765
Gulf	11,173	11,512	11,771
Mississippi	3,076	3,166	2,176
New Mexico	6,742	6,634	5,894
Oklahoma and Kansas	36,913	37,706	34,125
Texas	116,912	115,321	112,399
East Texas	15,112	15,057	15,787
West Texas	48,413	47,968	41,952
Texas Gulf	25,527	24,709	27,221
Other Texas	27,860	27,587	27,439
Rocky Mountain	13,819	13,946	12,646
California	30,493	30,528	35,495
Foreign	8,007	7,934	6,305
Total	247,506	247,599	240,943

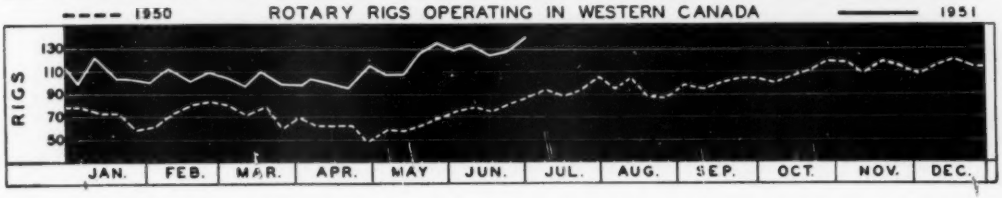
*Bureau of Mines.









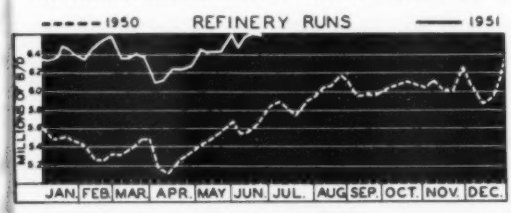


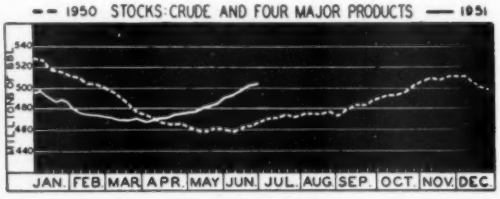
A.P.I. REFINERY REPORT, JUNE 30

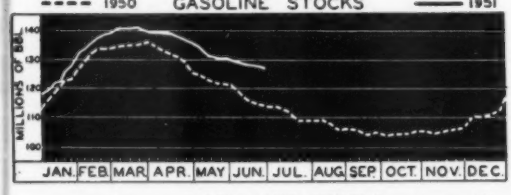
(Thousands of barrels)

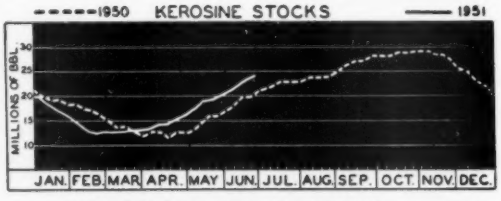
District	Daily avg. crude runs	Daily average production				Stocks at refineries, bulk terminals, in transit and in pipe lines				Bureau of Mines, June 1950				
		Gasoline*	Kerosine	Distillate	Residual	Gasoline†	Kerosine	Distillate	Residual	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual
East Coast	1,054	385.4	43.8	205.3	241.6	27,808	9,479	19,691	9,668	924	399.9	33.7	183.3	187.5
Appalachian:														
District 1	107	43.4	5.4	17.4	11.3	3,015	523	776	313	92	42.7	4.4	11.8	8.2
District 2	79	36.0	6.6	9.1	17.0	1,385	291	381	240	71	33.1	2.1	9.4	13.5
Ind., Ill., Ky.	1,246	647.9	92.3	170.6	166.3	28,296	4,707	13,984	4,284	1,042	564.2	63.5	156.0	142.6
Okla., Kans., Mo.	555	308.7	13.6	129.7	70.1	14,508	1,358	7,808	1,504	502	273.3	16.1	104.3	59.6
Inland Texas	268	168.6	14.4	48.2	46.4	3,420	442	1,204	822	209	133.5	10.3	28.8	43.6
Texas Gulf Coast	1,544	698.3	106.3	327.7	243.3	18,511	4,167	8,018	4,547	1,189	561.2	88.0	246.1	209.1
La. Gulf Coast	503	230.4	22.3	149.7	63.9	6,509	2,096	3,654	1,720	456	224.7	44.0	100.5	59.4
N. La. and Ark.	54	24.0	5.3	5.3	8.3	2,513	350	742	89	68	25.2	5.9	14.0	10.2
Rocky Mountain:														
New Mexico	14	8.4		2.9	3.1	106		59	31	14	7.6	0.4	2.3	3.8
Other Rocky Mtn.	237	110.1	4.3	46.0	48.9	5,342	306	1,509	1,055	197	85.9	4.2	36.5	35.0
California	934	427.9	10.0	108.4	370.7	15,431	423	7,874	16,824	891	397.0	10.0	144.0	296.1
June 30, 1951	6,595	3,095.1	324.3	1,220.3	1,290.9	126,844	24,142	65,700	41,097	5,655	2,748.3	282.6	1,037.0	1,068.6
June 23, 1951	6,649	3,158.1	367.1	1,258.0	1,327.9	127,736	23,771	62,969	40,647					
July 1, 1950	5,851	2,785.3	309.9	1,083.1	1,120.1	114,139	21,229	53,335	40,542					

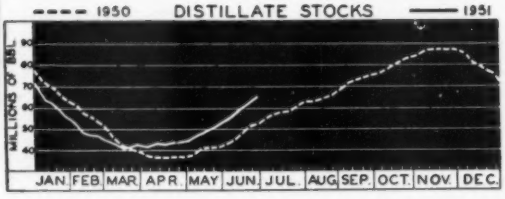
*At refineries including natural blended. †Finished and unfinished.

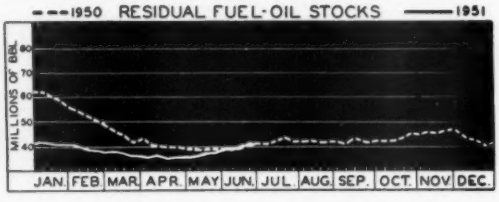


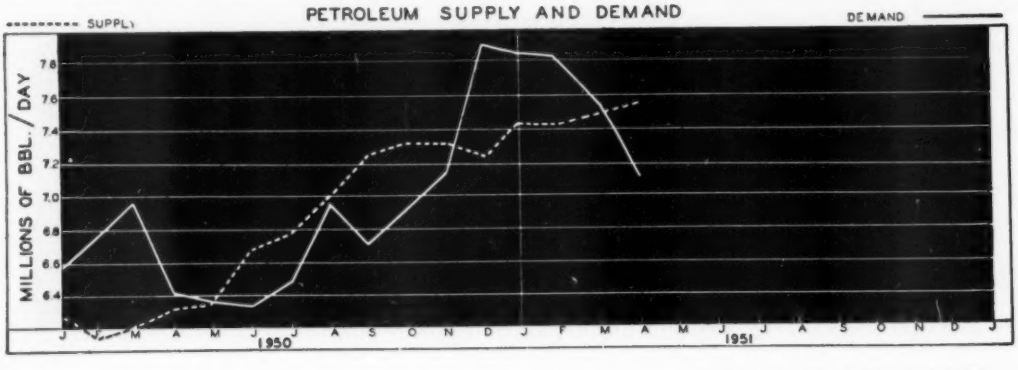












CRUDE PRICES
GRAVITY SCHEDULE

	Signal Hill, Calif.‡	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.93			
19-19.9	1.98			
20-20.9	2.03	$2.25		$2.12
21-21.9	2.07	2.27		2.14
22-22.9	2.12	2.29		2.16
23-23.9	2.18	2.31		2.18
24-24.9	2.24	2.33	$2.56	2.20
25-25.9	2.30	2.35	2.58	2.22
26-26.9	2.36	2.37	2.60	2.24
27-27.9	2.41	2.39	2.62	2.26
28-28.9	2.46	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.57	2.45	2.68	2.32
31-31.9	2.62	2.47	2.70	2.34
32-32.9	2.68	2.49	2.72	2.36
33-33.9		2.51	2.74	2.38
34-34.9		2.53	2.76	2.40
35-35.9		2.55	2.78	2.42
36-36.9		2.57	2.80	2.44
37-37.9		2.59	2.82	2.46
38-38.9		2.61	2.84	2.48
39-39.9		2.63	2.86	2.50
40 and above		2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6 1947.

‡Standard Oil Co. of California

FLAT CRUDE PRICES

Representative posted schedules per barrel

East Texas†	$2.65
Kettleman Hills, California*	2.80
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	4.25
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above

PRODUCT sales for export to British oil companies will disturb Gulf Coast and East Coast markets in direct proportion to the volume purchased. American markets have reflected the unsettled supply situation in the Middle East since the first partial shutdown of the Abadan refinery in April. The general effect has been a further tightening of the residual market with some added strength for distillate and kerosine markets.

The outlook for heavy fuel in the New York Harbor area is indicated by the lack of bidding on a city contract for 550,000 bbl. of No. 6 fuel. Only one bid was received on this readvertised contract with the price up 30 cents because of the raised ceiling.

Esso Standard Oil Co. has withdrawn its cargo postings for No. 2 fuel and kerosine at Gulf Coast ports. The move was classified as realistic by some marketers since most spot sales on the Gulf Coast have been at a higher price. Esso had continued a posting of 7.5 cents for No. 2 fuel when most sales on the spot market were at 8 cents and above.

The loss of this low posting may bring further pressure for higher ceilings on kerosine and distillate fuels along the East Coast. Spot buyers in Gulf Coast markets cannot pay 8 cents and sell in New York at 9 cents except in periods of reduced tanker rates, and the disturbed condition of supplies for Europe and southern Asia point to higher, not lower, tanker rates.

At the end of the first week in July Sun Oil Co. still held its cut of 1 cent a gallon in gasoline tank-wagon prices to dealers in the New York area despite the return to the old price by some of the other major suppliers. East Coast gasoline stocks are only 2,000,000 bbl. above last year, a smaller relative increase than for the nation as a whole and much less than for the inland areas.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of July 9, 1951. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	$10^1/_4$-$10^1/_2$	12-12.75	$10^3/_4$-11
Premium gasoline, 86-88 octane	$11^1/_4$-$11^1/_2$	13.5-13.75	$11^3/_4$-12
42-44 w.w. kerosine	9-$9^3/_8$	10	9
No. 2 straw fuel oil	8-$8^3/_8$	9	8
No. 6 residual	$1.75-1.80	$2.45-2.60	$1.75-1.90

NATURAL GASOLINE

	North Group 3	Texas	N. La.
Grade 26-70	$5^1/_2$	5	$5^1/_4$
Grade 18-55	6.6	6.1	6.35

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	13-13.5
750 vis., No. 3-4 neutral	16
2,000 No. 5-6 neutral	18-19

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	29-30
200 vis., No. 3 neutral, 0-10 pp.	17.5-18.5

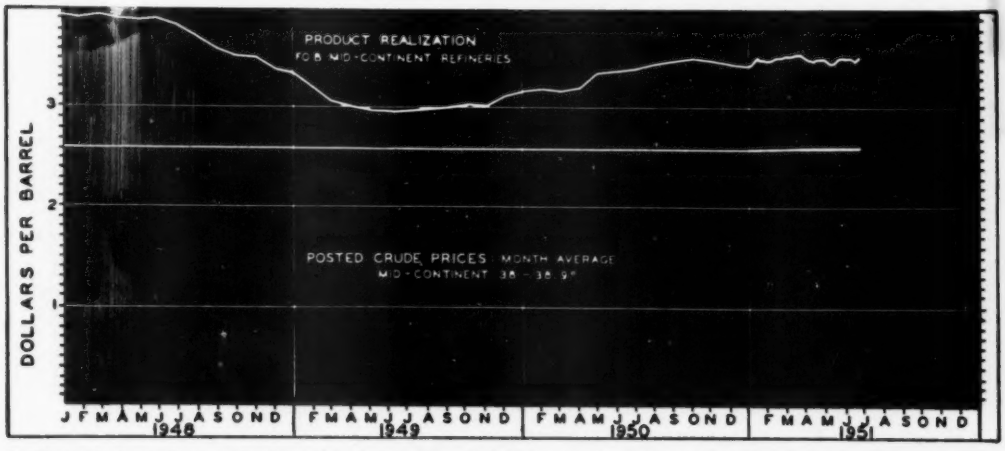
Western Pennsylvania

145-155 vis., 10 p.t. bright stock	32.5
180 vis., 0 p.t. neutral	31.5

WAX

Mid-Continent

132-134 A.M.P.	6.0


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
POSTED CRUDE PRICES: MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
DOLLARS PER BARREL
3
2
1
J F M A M J J A S O N D
1948
F M A M J J A S O N D
1949
F M A M J J A S O N D
1950
F M A M J J A S O N D
1951

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil. Realization averaged $3.52 for week ended June 30, $3.48 for previous week, and $3.39 for June 1950.

EQUIPMENT MEN . . . in the News

New Building and Store Opened by Bethlehem

Bethlehem Supply Co. has announced the opening of a new store at Sterling, Colo. A representative

B. C. BAYLESS

F. C. BEATTIE

stock of oil-country equipment and supplies will be available for service to the industry throughout the Denver-Julesburg basin.

B. C. Bayless, formerly assistant store manager at Casper, Wyo., has been appointed store manager and field representative.

Bethlehem has also erected a new standard store building in Oklahoma City which will provide modern facilities and improved services throughout Central Oklahoma. Increased storage space has been made available for stocking drilling, production, refining, and pipe-line equipment and supplies. A separate building will house a modern bottom-hole-pump shop and wire-rope-storage dock.

F. C. (Fred) Beattie, store manager and field representative; Thomas and B. C. Urquhart, field representatives, will continue in their respective capacities.

Schlumberger Announces Several Personnel Changes

Current personnel changes in Schlumberger Well Surveying Corp. have been announced by Pierre Schlumberger, president of the corporation.

A. P. Claudet, present manager of the southeast area, New Orleans, has been appointed vice president and general manager of Schlumberger Well Surveying Corp., Surenco, S. A., and of the Schlumberger office of Latin America, S. A. He will assume his new assignment in early July in Caracas, Venezuela.

C. A. Doh, formerly area manager of the northeast area in Mattoon, Ill., has been appointed to replace Claudet as manager of the southeast area. Doh has been area manager in Mattoon since 1945 and previously has been assigned to positions in East Texas, Venezuela, Trinidad, and Romania with Schlumberger Corp.

Vinson Supply Names Four Vice Presidents

Promotion of four veteran Vinson Supply executives to positions of vice president was announced recently by Bailie W. Vinson, president.

Granville B. Lane, associated with Vinson for the past 12 years, has been elected vice president. He will continue as head of Dallas operations where he will devote much of his time to Vinson steel warehouse and steel stocks.

W. O. (Casey) Jones was appointed vice president in the Dallas offices, where he will specialize in the supply lines of pipe, valves, fittings, and controls.

John H. Heinzerling was elected vice president of the Tulsa general offices where he will specialize in

G. B. LANE

W. O. JONES

the development of instrumentation and controls. He has been associated with Vinson for the last 10 years.

Benny E. Keeling has been elected

J. H. HEINZERLING

B. E. KEELING

vice president in charge of West Texas operations with headquarters at the new Vinson warehouse in Odessa. Keeling has also been associated with Vinson for 10 years.

Other officers elected were: Joe M. McReynolds, executive vice president; Charles B. Grant, secretary-treasurer; and Joe E. Edwards, assistant secretary-treasurer.

Halliburton Officer Named To Department of Commerce

Ellroy King, vice president of Halliburton Portland Cement Co., Corpus Christi, has accepted an appointment by the Department of Commerce as a member of the Cement Industry Advisory Committee, a division of the National Production Authority.

King flew to Washington, D. C., for the first meeting of the committee in late June.

Dowell Named New Sales Engineer at Blaw-Knox

Blaw-Knox Construction Co., engineers and constructors of complete petrochemical refineries, gasoline plants, compressor stations, and chemical-process plants, announce the appointment of Martin L. Dowell as sales engineer for its southwestern division, with offices in Tulsa.

Dowell moved to Tulsa from Fort Worth in 1943, and since that time he has been engaged in the sale of various types of petroleum and chemical-industry equipment and construction services.

Crane to Construct New Plant and General Offices

Construction of new general offices and plant facilities of Crane Packing Co., Chicago, is under way, according to Frank E. Payne, company president.

The new plant site will cover 133,000 sq. ft. when completed.

Crane manufactures industrial packings, mechanical seals, oil seals and, more recently, the new Lapmaster, a precision lapping machine.

Martin & Co. Appointed Hilliard Representative

Hilliard Corp. announces the appointment of Guy T. Martin & Co., Gardena, Calif., as its California representative to distribute its entire line of Hilco lubricating, fuel, and industrial oil-purification equipment. With Martin & Co. as representatives, Hilliard will have representation along the entire West Coast.

Renn to Head Oil Base Office at Houston

Oil Base, Inc., has announced the establishment of a Gulf Coast office at Houston with Phil Renn as manager. Renn comes to Oil Base from Cardinal Chemicals, Inc., where he was in charge of the Gulf Coast area. Prior to this he was sales engineer for Baroid Sales Division for several years in the Gulf Coast area.

Renn is a graduate in chemical engineering from Rice Institute, and his varied drilling experience includes 3 years with Lago Petroleum Corp. in Venezuela.

Cochran to Manage Rocky Mt. Region for Rockwell

O. COCHRAN

C. R. Zeskey, Kansas City district sales manager for Rockwell Manufacturing Co., has announced the appointment of Orville Cochran as supervisor of gas products and Nordstrom Valves in the Rocky Mountain area.

Cochran has been affiliated with Rockwell for over 25 years. During that time he has served as head of the service department, sales engineer, and field representative for Nordstrom valves in the Kansas City territory.

United Supply Adds IDECO Line of Drilling Rigs

United Supply & Manufacturing Co. has added the Ideco line of drilling rigs to its list of drilling and production equipment, it was announced recently by H. B. Gutelius, Jr., vice president.

United will stock Ideco accessories and will also maintain a service department in each of its stores for Ideco equipment. United Supply operates 21 stores strategically located in Oklahoma, Kansas, Texas, Louisiana, and New Mexico. Four sales offices are also maintained at Hobbs, N. M., San Antonio, Dallas, and Shreveport.

Pacific Valves Expands Offices and Factory

Pacific Valves, Inc., Long Beach, Calif., has recently completed another phase of its long-range expansion program, including the expansion of both its factory and offices. It is estimated this work will run over $100,000 for building facilities and an additional $350,000 for new machine tools.

The factory was enlarged to include a wide loading dock, and its offices were doubled in size by the addition of a second floor.

Pacific Valves specializes in the manufacture of cast-steel gate, globe, and angle swing check valves for industry. Sales offices are maintained in Houston and New York City, and sales representatives in San Francisco, Salt Lake City, Seattle, St. Louis, Tulsa, Denver, Chicago, Pittsburgh, Cleveland, Kansas City, and Atlanta.

Plant Expansion Announced By White-Roth Machine

White-Roth Machine Corp., Lorain, Ohio, has announced the expansion of its present plant to house manufacturing operations for special government work. Completion of the new steel and brick structure will increase production area by over 40 per cent, according to George Roth, president.

The present plant will house fabricating and assembling operations for the company's line of diesel and gas engines and compressors and manufacturing operations for special processing equipment.

Chiksan Co. Announces New Sales Appointments

Chiksan Co., Brea, Calif., has appointed N. A. (Lee) Guill as division manager of its Chicago branch office, and sales supervisor of the Chicago district. W. L. Clark has been appointed Chiksan sales representative in the Chicago territory and assistant to Guill.

G. W. Beecroft & Co., Toronto, has been named Chiksan sales representative for the province of Ontario. Sociedade Commercial de Materias Primas, Ltda., Rio De Janeiro, has been appointed Chiksan representative in Brazil.

Donohoe Is Vice President Of Mixing Equipment Co.

J. V. DONOHOE

James V. Donohoe has been named vice president in charge of sales of Mixing Equipment Co., Inc., according to an announcement by Fred M. Gordon, Jr., president of the company.

Donohoe has served with Mixing Equipment Co. for 17 years. He joined the local firm in 1934 and was purchasing agent for 5 years. Following this tenure he served as office manager, assistant sales manager, and in January 1949 was named sales manager.

General Controls Adds to Present Building Site

Construction on a 24,000-sq. ft. addition to the present engineering building has begun at the Glendale plant of General Controls Co., according to W. A. Ray, president. The new structure will be two stories in height.

The considerable increase in engineering and research activities was brought on largely by the need for an expanded civilian-product line. The additional facilities will be devoted entirely to research and activity.

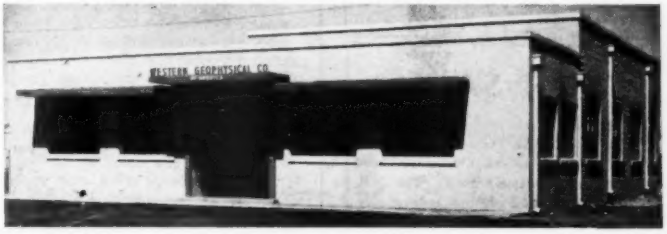
Musser Appointed Sales Representative by Ludlow

Glenn W. Musser has been appointed sales representative of Ludlow Valve Manufacturing Co., Inc., to head the Southwest territory. Musser completed technical training at the company's factory at Troy, N. Y., and now makes his headquarters in Houston.

Musser will represent Ludlow in Texas, Louisiana, and Oklahoma.

(Continued on page 160)

Western Geophysical Opens New District Office



Continuing its program of expansion, Western Geophysical Co. of America recently moved into its new West Texas and New Mexico district office at Midland, Tex. Headquartered here are George J. Shoup and Fred J. Di Gulio, supervising geophysicists. Other personnel are W. T. Ross, recording instrument supervisor; J. H. Frazier, shop superintendent, and D. F. King, drilling supervisor.

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EQUIPMENT FOR SALE

USED ROTARY AND CABLE TOOL DRILLING TOOLS, WIRE LINES, E. A. KELLY, BOX 861, OKLAHOMA CITY. PHONE 5-6407.

NEW CASING—5½" OD 14# Range 3, 8 Thread, 3,000'. TUBING—2⅜" Upset, Near New, 1400'. POWER UNIT—International U10, Butane Carb., Complete Clutch and V-Pulley, $485.00. Rebuilt and Guaranteed. Earl Oslin, 1224 Lane, Falls City, Nebraska. Phone Red 744.

3600 FEET NEW 2⅞" drill pipe. USED Cardwell RL Model Rotary Rig complete. USED Wilson Titan Rotary Rig complete. General Equipment Co., Inc., 815 Daniel Bldg., Phone 2-6764, Tulsa, Oklahoma.

DRILLING Mud. Colo. Bentonite, it swells, it jells. Few equal, none better. Send for sample. Our price saves you money. Pressey & Sons, Pueblo, Colorado.

90 HP. Direct Driven Superior Gas Compressor. Location Oklahoma. Alfred B. Kern, 223 Wright Bldg., Tulsa, Oklahoma.

1200' 7" casing, Sparta Spudder, Heavy Duty Oil Field Truck, 1½ ton. Miscellaneous equipment. C. M. Storm, 1521 Central Ave., Great Falls, Mont.

BUCYRUS, Ft. Worth, Wichita spudders. Franks, Longyear rotaries. Good used Equipment. Also tools, pipe, cable. Everything for well drilling. Fishing tools rented—Pressey & Son, Pueblo, Colo.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 30-25-50 KW Generating Units

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

FOR SALE

45 Star Heavy Duty Spudder complete with all tools, new Kohler light plant and hand tools. Power: 13000 cat Diesel, 60' steel mast. New wire throughout. Herbert H. Hart, Box 34, Phone 411, Virgil, Kansas, or C. V. Cross, Phone 256, Eureka, Kansas.

FOR SALE

Six 125 H.P. Horizontal Clark Engines, Overhead Exhaust. Connected with 3—7¼ X 20 Compressors. Connected with 3—17 X 20 Low Compressors. The best repressure engines on the market for economy and dependability. Located 7 Miles Northeast of Graham, Texas

KNOX REFINING CO.
L. D. 59, Enid, Okla.

EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

FOR SALE: One String of Cable Drilling Tools complete with Casing and Derricks. Contact H. H. Blair, 600 Bitting Building, Wichita, Kansas. Telephone #7-3241.

FOREIGN SEAMLESS CASING
A. P. I. Specifications. Subject to letter of credit. Box E-179, The Oil and Gas Journal, Tulsa, Oklahoma.

PORTABLE DRILLING rig 2000 ft. capacity for core drilling water well or shallow production. Completely overhauled like new ready for work. 1738 Proctor, Dallas, Texas. Phone Elmhurst 1154, Greenwood Machine & Engineering Co.

100,000 feet

1¼-In. Standard Black Pipe

29' R.L.

Excellent Used Condition
Available for immediate shipment
Subject to prior sale

Write-Wire-Phone

SONKEN-GALAMBA CORP.
2nd and Riverview (X-736)
Kansas City 18, Kansas
THatcher 9243

EQUIPMENT FOR SALE

PIPE
ALL SIZES: LINE PIPE AND CASING, TANKS, AND OILFIELD SUPPLIES. EDCO PIPE & SUPPLY CO., PHONES 933 OR 1298, DRUMRIGHT, OKLA.

IMMEDIATE delivery complete workover Jack Knife Rig. Details and price on application. P. O. Box 3246, Corpus Christi, Tex.

FOR SALE: One drilling rig complete including 127' Lee C. Moore mast and 7,200' of 4½" drill pipe. Rig capacity 7,500 ft. Now operating in Oklahoma. All equipment A-1 mechanical condition. For further details and inspection write Box E-132, The Oil and Gas Journal, Tulsa, Oklahoma.

2,600 ft. 7" OD 23# J-55 8RT Range 2 Good Used Seamless Casing
4,400 ft. 10¾" OD 40.5# J-55 8RT Range 2 Good Used Seamless Casing
1,900 ft. 16" OD 75# J-55 Good Used Seamless Casing

FRANK MORRIS & CO.
424 S. Cheyenne, Tulsa, Okla., Phone 2-8247

BUILDING & EQUIPMENT FOR SALE

4—160 H.P. type 75, Cooper twin compressor engines; 2—150 H. P. Bessemer engines. Also the following steel buildings: 1—30 X 104 ft., 1—32 X 26 ft., 1—12 X 28 ft. All valves and fittings accompany this plant.

THE MULLEN COMPANY
Box 479, or phone 468, Ardmore, Oklahoma.

PIPE FOR SALE!

THE FOLLOWING ITEMS AND MANY MORE ARE NOW AVAILABLE FOR IMMEDIATE DELIVERY—

6,200' 2⅜" O.D. 4.6# Used Lapweld, Threaded & Coupled, 11½ Thread.
15,000' 2⅜" O.D. 4.6# Once Run Seamless, Range 2, 10 Rd. Thread.
12,000' 7" O.D. 17# Used Lapweld Casing, T&C, 10 V-Thread.
180,000' ½" Standard Black Pipe, Plain Ends, 21' Lengths.
45,000' ¾" Standard Black Pipe, Plain Ends, 21' Lengths.
120,000' 1¼" Standard Black Pipe, Threaded & Coupled, 21' Lengths.
110,000' 1½" Standard Black Pipe, Threaded & Coupled, 21' Lengths.
40,000' 2¼" O.D. x Approx. .140" Wall 3.2# Reconditioned Seamless Tubing, Plain Ends, 14' Lengths and Over.
7,177' 2½" Standard Black Pipe, Plain Ends, 21' Lengths.
10,000' 3½" O.D. x .145" Wall 5.4# Reconditioned Seamless Tubing, Plain Ends, 14' Lengths and Over.
3,000' 5" Standard Black Pipe, Plain Ends, 21' Lengths.

ACT NOW! PHONE OR WIRE COLLECT YOUR REQUIREMENTS TODAY

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$1,500,000 VALUE, LITTLE USED, RECONDITIONED, MODERN, EARTH MOVING & PLATE FABRICATING EQUIPMENT

Subject to Owner's Acceptance or Rejection As Per Rules Posted at Premises

At Manassas, Va., 15 MILES S.W. OF WASHINGTON, D. C. ***Tuesday Aug. 7th,*** STARTING 10 A.M. DST.

NEAR YARD OF SOUTHERN R.R. DEPOT

PARTIAL LIST OF THIS ALMOST NEW EQUIPMENT USED ON ONE OF THE INCH LINES

TRACTORS

4—HD-19-AC Berg Sideboom
3—TD-24 Int. Sup. Sideboom
11—TD-18 Int. Sup. Sideboom
3—TD-14 Int. Sup. Sideboom
1—D6 Cat. trackson Sideboom
1—D4 Cat. trackson Sideboom
3—HD-19-AC Baker H. Dozer
4—TD-24 Int.—angle, cable and bull
4—TD-18 Int. Angle and winch
5—TD-14 Int. Angle winch & bull
1—TD-13 Int. winch & high lift
3—TD-14 Int. winch & high lift
2—50-Cat. Winch & high lift

TRUCKS

1—Hendrickson Diesel
1—KS Int.
1—KBR-12 International 47
1—KBR-11 International 47
2—Chev. 4 x 4 1½ T Army 44
10—2 ton Chev. Flat 50
4—2 ton Chev. Flat 49
2—2 ton Ford Flat 46
6—1½ ton Dodge Flat 48

Spares of metal parts for most of these fine pieces of equipment.

DITCHERS

2—51 Buckeye, tracks & conveyor
1—48 Buckeye, tracks & conveyor

HOES—DRAGLINES—CRANES

2—¾ yd Lorain, truck & cat combined
1—½" P & H Insley—hoe and drag

DOPE POTS

1—125 bbl. Smith on Lowboy trailer
5—35 bbl. Smith on tracks, air comp., etc.
3—25 bbl. Smith on tracks, air comp., etc.
2—12 bbl. Smith on tracks, air comp., etc.

WATER PUMPS

4—6" Jaeger, gas driven
2—6" Gorman Rupp, gas driven
4—4" Gorman Rupp, gas driven
1—3" Gorman Rupp, gas driven
1—2½" Gorman Rupp, gas driven
1—3" Marlow, gas driven
1—2" Garver, gas driven

DRAGLINE BUCKETS, CLAMS, ETC.

1—¾ yd. Petty Bone Mullikan Clam
1—¾ yd. Hendrix Dragline Bucket
2—½ yd. Kesler Clam Bucket
1—½ yd. Link Belt Dragline Bucket

ROOT RAKES

1—Southern Welding for Int. TD-18 Dozer
1—Southern Welding for Cat. HD-7 Dozer

ROAD BORING MACHINES

1—Young Under Road Machine

TRAILERS

2—Hobbs—8-tire
1—Hobbs 40 ton Lowboy
1—Shop 60 ton Lowboy
2—Hobbs single axle

PICK UP TRUCKS

17—½ ton Chevrolet 1950
6—48 Willys Jeep

WELDERS

37—200 amp Lincoln, gas driven

AIR COMPRESSORS

1—500 C.F. I.R.—pneumatic tires—Diesel
1—500 C.F. Jaeger—pneumatic tires—Diesel
2—315 C.F. Schram, half tracks—Diesel
1—210 C.F. Schram, pneumatic tires—gas

CUTTING—GAS WELDING

10—Combination Cutting & Welding sets—Torches and gauges

PIPE CRADLES

11 Sets—Crose 26"—31"

YOKES

4 Sets (single tree)

SLINGS

30—Crose Pipeline belt slings

CUTTING & BEVELING MACHINES

7—Crose 30"

HAND INTERNAL CLAMPS

9—Crose 30"

OUTSIDE WELDING CLAMPS

8 Sets—30" Tipton

AUTOMATIC RELEASE TONGS

7—Type CT 300-2-7-30" Cardwell Automatic

LIGHT & POWER UNITS

2—Hohler 1M21—60 cy.
1—Sterling—60 cy.
1—Int. U1—60 cy.

MISCELLANEOUS

1—I.R. 2½ Pneumatic Pump
1—48" Mall Chain Saw

Hundreds of items of small tools too numerous to mention.

WAGON DRILLS—JACK HAMMERS

2—I.R. Twin wagon drill
1—Cleveland Twin Wagon Drill
18—Jack Hammers
10—Pavement Breakers
2—Tampers G.D.
1—Lot Drill steel, buts, hose, repair parts, etc.

Large store of hard-to-get supplies—drill rod, etc.
1 Lot 30" Welded Pipe consisting of odds & ends.

INSPECT AT ONCE — YOU CAN HAVE AN OPERATIVE DEMONSTRATION!

INSPECTION JULY 16th TO DATE OF SALE • WIRE, WRITE OR PHONE FOR INFORMATION

HETZ AUCTION SALES

P. O. BOX 671, WARREN, OHIO. PH. NILES, OHIO, 2-2509
PHONE AT PROJECT: MANASSAS 490
FT. WORTH PH. FANNIN 6147

EQUIPMENT FOR SALE

FOR SALE: 1—1947 Model GMC Diesel Tandem 65 Tulsa Winch air equipped. 20 foot body. 12" Roller, 1100x22 tires, is good truck in top shape. Too large for this field. Box 706, Drumright, Oklahoma.

FOR SALE: Mayhew 2000 drill. Has drilled two 1000-ft. and one 1700-ft. holes. Mounted on GMC 6 x 6. Has new 145 H.P. auxiliary engines. Rig, elevators, slips, Misc. tools—cash price $17,500. Drilling Bit & Supply Co., Princeton, Indiana.

FOR SALE: Superior - General Electric natural gas engine - generating unit. 1-685 hp., 480 kw., 327 r.p.m., 480 v., 3-phase, 60-cycle. 1—510 hp., 350 kw., 400 r.p.m., 480 v., 3-phase, 60-cycle. Complete with exciters and generating panels. All in A-1 condition. Will consider selling engine separately. Max E. Landry, Inc., Tulsa, Oklahoma. Phone 5-5639.

LIGHT PLANT: Model 3GG-30 Stewart & Stevenson AC generator, 3 phase, 60 cycle, 30 KW, 1200 RPM, 440 volts, 39 amps., with a Continental Red Seal 6 cylinder motor, all skid mounted. Completely overhauled and in same as new condition. Brown Pipe & Machinery Co., P. O. Box 2368 Corpus Christi, Texas. Phone 3-9391.

FOR SALE

Good Used 6⅝" O. D. 8 thread line pipe couplings — cleaned or uncleaned. Write or wire Box 574, Tulsa, Okla.

CASING

Have 6,000′ of 9⅝" 36 lb. J-55 Seamless Casing on order for third quarter delivery. Would like to trade this tonnage for 5½" or 7" seamless suitable for 9,600′ well. Phone 3-8601, Shreveport, Louisiana.

PRESSURE VESSELS

Quantity	Description
1	4′ x 40′ x 4" Forged Seamless
1	10′ x 30′ x ⅞" Riveted & Welded
2	10′ x 30′ x ½" Riveted
2	9-2 x 39′ x 1 1/16" Riveted & Welded
1	10′ x 39-9 x 11/16" x 1" Heads—Riveted—3 Trays x 63 C.I. Bubble Caps/Tray—3 Baffle Plates rated 750 F.
1	6′ x 28′ x ⅜" Riveter—16 Trays, Spacing 16"
1	5′ x 12-6 x 7/16" Riveted & Welded 5 trays-spacing 20"
1	5′ x 30′ x ⅜" Riveted & Welded, with Tulsa Type Mist Extractor 10 trays-spacing 20"
1	3-6 x 50′ x ½" Riveted & Welded—4 trays with 16" spacing; 2-4 x 10′ condenser on top
3	5′ x 28′ x 7/16" Riveted & Welded

CAST IRON PIPE

Quantity	Size	Ends	Class
2,000′	24"	B&S	200
1,500′	18"	do	200
2,160′	14"	do	200
454′	12"	do	200
625′	8"	PE	150
123′	8"	PLG	150
351′	6"	PE	150

BROWN-STRAUSS CORPORATION
1546 Guinotte Phone: Ha. 1000
Kansas City 10, Missouri

EQUIPMENT FOR SALE

11,500 GAL. 200 lb. pres. U201 propane tank, 25,000 gal. 75 lb. pres. butane tank. L. M. Stanhope, Rosemont, Pa.

FOR SALE: Ideal slush pump, Model C-150. Melton Supply Company, Seminole, Oklahoma.

ONE STRING of cable drilling tools, 5,000 ft. capacity with Parkersburg Rig and Rüse Drilling Motor. Tools to drill 13, 10, 8, and 7-inch holes. Everything in A-1 condition. Complete, $6,500. Contact Weir Walker, R.D. #4, Washington, Pa.

FOR SALE: National 50 rotary drilling rig, NKU Waukesha engines, new Lee C. Moore 130′ 315,000# capacity mast with substructure, new 7¼ x 14 Gardner - Denver pump, good drill pipe, everything complete and in first-lass condition. H. Waggoner Drilling Co., Box 4657, Oklahoma City, Okla. Phone 64-1413.

FOR SALE: Two Sullivan Model 22 H.D. Rotary Drill Rigs, one mounted on Ford Truck, One mounted on Half Track, complete with towers, tools, drill rods and Hughes Bits, $6,500.00 each. 1—C.N.P. Electric Driven 10x12 Air Compressor complete, $1,500.00. 7—Electric driven Double suction Water pumps, 6" to 12" discharge. 1—21 S Hopper Charge Power dump, water measuring, timing device Mixer, gas or electric driven, $750.00. 1—New Jaeger 10" Gas driven pump, $1,200.00. 1—Owen ¾ yd. Type O double shaft heavy clam shell with teeth, $600.00. 1—2½ yd. Page Dragline bucket, new teeth, $500.00. Lyons Construction Company, Whitehall, Mich. Phone 23515.

FOR SALE: R. L. Cardwell with GAK Waukesha. 1st class condition, $5,000. One super model Wilson single drum servicing unit, 80 hp. Waukesha, 4,000′ wire, all tubing tools, mounted on GM 4-wheel drive truck. $3500. Phone Rogers Pipe and Supply Co., Tulsa, Okla.

ELECTRIC WELL CASING

20,000′ 7" O.D. 17 lb. H40 8 RT R2 No. 1 Used
4,400′ 7" O.D. 20 lb. J55 8 RT R2 No. 1 Used

SEAMLESS CASING

2,400′ 10¾ O.D. 40.5 lb. J55 8 RT R2 Good Used
1,000′ 16" O.D. 61 lb. J55 8 RT R 1 & 2 Good Used

FRANK MORRIS & CO.
4245 S. Cheyenne, Tulsa, Okla. Ph. 2-6247

FOR SALE

SEAMLESS OW CASING AND TUBING

10,000′ New J55 27⅞" O.D. external Upset 8 RT R2
10,000′ New and Used J55 and H40 5½" O.D. 14# 8 RT R2, Used in hole not over 3 days
3,000′ New and Used H40—7" O.D. 17# 8 RT R2, Used in hole not over 3 days
900′ #1 Used J55—8⅝" O.D. 24# 8 RT R2
4,000′ #1 Used J55—7" O.D.—20" (Republic) 8 RT R2, in hole 2 weeks

MICHIGAN CARLON PIPE CO.
20120 Livernois Ave., Detroit 21, Michigan
Diamond 1-1400

BUTANE-PROPANE EQUIPMENT

Gasaire Propane Mixers & Vaporizers (5). Bruner LPG-5 Compressors (2).

PRESSURE VESSELS

3,500 gal. 5′x24′x¾" 200 PSI (5).
3,700 gal. 5′x25′x1¼" 20 PSI.
8,200 gal. 6′x40′x2" 390 PSI. (2).
10,500 gal. 9′x23′x⅞" 150 PSI.
16,000 gal. 8′x45′x¾" 150 PSI., ASME.
25,000 gal. 10′x40′x1 1/16" 290 PSI, ASME.

TANK CAR TANKS

6,500 gal. 76" x 27′10" Extra Heavy (30).

HEAT & POWER CO., INC.
70 Pine St., N. Y. 5 HAnover 2-4890

EQUIPMENT FOR SALE

WELL EQUIPMENT: New and used spudders, rotaries, core drills — all sizes and types. Cable tools, drill pipe, bits, pipe, Fishing tools. Everything for Well Service. Pressey & Son, Pueblo, Colorado.

ONE—6¼" x 30′ American HT Drill collar; 1—XAHU Waukesha Engine; 1—13¾" Pilot Surface Bit; 2—4" x 5" Piston Type Water Pumps with engines. B. L. Rucker, Phone 1072 or 480, Mount Vernon, Illinois.

FOR SALE: Bucyrus-Erie 36L Skid type Waukesha powered. Complete five and seven inch drilling tools, steel tool house, Kohler light plant, New ⅞ X 4500 Drilling line, ⅝ X 4500 sand line, ⅞ X 450 tubing line. Complete set rod and tubing tools, good timbers, and flooring, steel dump box, and steel tool rack. Rig is in A-1 shape and running at present time. Can give immediate delivery. Two Wilson rod and tubing units, single and double drum, with telescoping poles, complete with all tools and mounted on trucks. Crew cars to go with each unit. Both units fully equipped and in A-1 shape. Guss Irvin Well Servicing Co., Box 112, Stinnett, Texas. Phone #1.

FOR SALE: 2—12" 6,000# QRC Preventers skidded; 2—210 brl. National Welded Tanks; 2—60′ American Derricks, 104,000# capacity, portable in 30′ sections. Lum Price, 417 E. 16th, Houston, Texas. UNderwood 8945.

FOR SALE: Seamless casing and tubing new and second hand. Phone Rogers Pipe and Supply Co., Tulsa, Okla.

EQUIPMENT NOT IN USE: Did you find a buyer in this column for the equipment you have for sale. Someone wants it and an "Equipment For Sale" classified advertisement in the Journal will find a buyer. See box heading for classified rates or write The Oil and Gas Journal.

EQUIPMENT WANTED

NEED immediately small mounted rotary with good drill pipe not less than 2500 capacity for S. W. Wyoming operations. Transco Gas and Oil Corp., 200 N. Third St., Albuquerque, N. Mex.

WANTED: Four Class B-36 strut type 500# W. P. C. & G. Cooper Company used compressor assemblies including cylinder bases. See Cooper spare parts sheet CB-36-3. Contact Cities Service Gas Company, C. D. Rogers, P. O. Box 1162, Wichita, Kansas.

WANT EQUIPMENT: Did you find the equipment you wish to purchase in this column? If not, use an "Equipment Wanted" classified advertisement to find it. It is available somewhere and Journal classified advertisements will find it. See box heading for classified rates, or write The Oil and Gas Journal.

WANTED

New and Used BOLTED TYPE STEEL TANKS
Also WELDED & RIVETED STEEL TANKS in all Sizes
Also New and Used STEEL CASING, TUBING & PIPE
Will Dismantle
Will pay highest prices

Please phone or wire collect

A. GREENSPON PIPE CO., INC.
(In business over 74 yrs.)
3615 Olive St., St. Louis 8, Mo., LUcas 5851

EXPLORATION SERVICE

CORE HOLES

We core hole your acreage with up-to-date equipment. If desired, we do surface and subsurface mapping and run electrical surveys in connection with your coreholing program.
Service anywhere in the United States. Our work is fast, efficient and CONFIDENTIAL.
Contact us for terms and other information.

EL DORADO DRILLING CO.
Box 527, El Dorado, Arkansas

HELP WANTED

WANTED: Seismologist for permanent assignment division office in Tulsa. Reply Box E-166, The Oil and Gas Journal, Tulsa, Okla.

DRILLING contracting and oil producing company wants man experienced in producing and completing wells. Duties will be with both contract drilling and producing operations. Age 30 to 35 years. Area Ark-La-Tex. Replies confidential. Box E-187, care of The Oil and Gas Journal, Tulsa, Oklahoma.

AGGRESSIVE OIL EXECUTIVE — Substantial independent producing company wants aggressive, high type, responsible executive as Manager West Texas-New Mexico Division. Applicant should be under 35 years of age, 10 years experience land and geological work preferably West Texas-New Mexico area. Applicant must be equipped to find and negotiate for wildcat, undeveloped, and developed properties and leases, appraise submittals, manage present West Texas office. Excellent compensation. When repiying give full details, include photograph. Our present employes not considered for this position. Box E-194, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEERS, Executives, Technical Men. Salaried positions—$3600 to $30,000. This confidential service for outstanding men who desire a change of connection. Will develop and conduct preliminary negotiations without risk to present position. Send name and address for details. Tomsett Associates, 1204 Berger Bldg., Pittsburgh 19, Pa.

APPLICATIONS now being received from Petroleum, Chemical and Mechanical Engineers with a Ph.D. degree and petroleum reservoir engineering experience for teaching positions on the petroleum engineering staff of a Southwestern institution. Salary based on background. Initiative essential. Interviews during July and September. Appointments effective September 1. Consulting and research encouraged. Send all data including a recent photograph to Box E-191, The Oil and Gas Journal, Tulsa, Oklahoma.

EXCELLENT opportunity open for engineer capable of directing gas compressor sales program in Southwest. Must have previous experience and acquaintance in the oil and gas companies in that area. Reply to Box E-213, The Oil and Gas Journal, Tulsa, Oklahoma.

TECHNICAL graduate with all around experience on gasoline tests including CFR engine knocktesting. Some supervisory ability necessary. Required for Laboratory in Oklahoma. Reply stating salary expectation. Box E-214, The Oil and Gas Journal, Tulsa, Oklahoma.

LP GAS SALES ENGINEER

Eastern producer desires LP gas sales engineer preferably experienced in sales to dealers, industrial plants, and utilities. Please state full particulars and experience in reply to A-91, P. O Box 3575, Phila. 22, Pa.

WANTED—RESERVOIR ENGINEER

EXPERIENCED RESERVOIR engineer, by well established, progressive company in Mid-Continent area. Good opportunity for future. Must have not less than 3 years practical experience. Submit qualifications, scholastic training and experience in first letter. Replies confidential. Box E-195, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

EXECUTIVE to head up new department of an engineering company to do exploratory drilling and develop petrochemical opportunities. Top level experience and connections required. Give specific qualifications and experience. Box E-197, The Oil and Gas Journal, Tulsa, Okla.

A Chemical Engineer—Major Oil Company Refinery in Oklahoma. State qualifications and salary expected. Write Personnel Department, Box 381, Tulsa, Oklahoma.

FOREIGN and Domestic Oil Employment Directory covering the oil industry, showing where to apply for jobs. Price $5.00 Oil Industry Mailing List, Box 2005, Tulsa, Okla.

THE RIGHT MAN: Can you fill the position you have open from the qualifications listed in this column. Men are always looking for an opportunity to improve themselves. Use a "Help Wanted" Journal classified advertisement to find the men you need. See box heading for classified rates or write The Oil and Gas Journal.

SITUATIONS WANTED

COMPETENT petroleum engineer with practical experience in oil and gas production, well completion, and work-over work. Reservoir experience. Age 33. Box 213, The Oil and Gas Journal, Tulsa, Oklahoma.

FORMER Independent Oil Operator ten years, with legal education, plus eight years Wall Street experience, desires connection raise funds exploratory well drilling from excess profits taxpayers. Box D-938, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM Engineer-Geologist: 31, six years major company experience field engineering and subsurface geology Kansas, Oklahoma, North and South Texas. Desires connection with aggressive independent producer in Mid-Continent or Rockies. Best of references. Write Box E-216, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL Engineer: M. S. Degree, ten years diversified experience in Refining and Natural Gasoline. Age 35. Desire responsible position in Refining, Petro-Chemical or Sales. All replies considered. Box E-217, The Oil and Gas Journal, Tulsa, Oklahoma.

RETIRED Textile Business man, 54, desires association with small operator, can furnish bank reference, run office, operate typewriter. Familiar with credit problems. Box E-219, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No 131, Ph. No. 131, Hobbs, New Mexico.

THE POSITION YOU WANT: Oil industry companies are looking for men to fill every conceivable kind of position. If you didn't find the position in this column that you are looking for, use a "Situation Wanted" classified advertisement to state your qualifications. Some company is probably looking for your ability. See box heading for classified rates or write The Oil and Gas Journal.

SITUATIONS WANTED

CHEMICAL Engineer desires **responsible** position as technical and/or administrative assistant to executive in refining, natural gasoline or petrochemical industry, leading to managerial post. Eleven years experience in refining includes catalytic and thermal cracking, catalytic and thermal reforming, coking, alkyiation, polymerization, gas recovery and stabilization operations. Age 33, married, two children. Both domestic and foreign locations considered. Box E-220, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER: Desires position with oil company or allied industry. Eight years experience in Plant Technical Service and Production Supervision, on Gasoline Plants Refineries and Petrochemical Plants. Box E-175, The Oil and Gas Journal, Tulsa, Oklahoma.

DRILLING Contractor operating in West Texas and New Mexico desires to contact small or medium-sized independent oil company who needs an operating manager. Personal interview desired. Twenty years experience in all phases of the oil industry. Address replies to Box D-644, The Oil and Gas Journal, Tulsa, Oklahoma.

EXECUTIVE, ATTORNEY, TAX SPECIALIST: Fourteen years experience Production, Land, Legal, Geological and Executive departments producing companies. Four years Bureau of Internal Revenue. Prefer executive position with independent producing company. Box E-223, The Oil and Gas Journal, Tulsa, Oklahoma.

PIPE LINE ENGINEER, graduate, registered. 16 years supervisory experience gas transmission operations and construction, desires change, Houston or Gulf Coast. $8,000 permanent or $10,000 temporary. Box E-224, The Oil and Gas Journal, Tulsa, Oklahoma.

ROYALTIES

DEEDED ROYALTIES

San Juan Basin & Permian Basin. Write Harry S. Wright, Wright Bldg., Farmington, New Mexico.

MONTANA ROYALTIES

Millions of acres now leased by world's major companies, with huge drilling play in prospect. For booklet describing Montana geology and oil development, write Landowners Royalty Company, Box 1225, Great Falls, Montana.

WELL FISHING AND HANDLING TOOL —Mechanism powered within the tool, positive manual or automatic action controlled at surface, operable on cable or drill pipe. Grips either the outside or inside of objects. Will consider advanced royalty basis for Manufacturing Rights under patent pending. Box E-222, The Oil and Gas Journal, Tulsa, Okla.

I HAVE a new principle Rock Bit that will hold its own with any known bit today. Fully tested. Have contract with Oil Tool Co. to manufacture on royalty basis. Now ready for production. I will sell 1/10 to 1/5 of my royalty. Will demonstrate. Box E-225, The Oil and Gas Journal, Tulsa, Okla.

GET TOGETHER: Both Capital and Royalties are available. If the investment proposition you want isn't listed in this column, use a Journal classified advertisement to find it. See box heading for classified rates, or write The Oil and Gas Journal.

HELP WANTED

OPPORTUNITIES FOR TECHNICAL REFINERY PERSONNEL

for

LARGE INTERNATIONAL OIL CO.

Entertaining applications of graduate chemical, mechanical, structural and electrical engineers for refinery engineering assignments at home and abroad.

Engineers with refinery experience and also recent graduates will be considered.

Box E-143, The Oil and Gas Journal, Tulsa, Oklahoma

WANT TO BUY

PRODUCING ROYALTIES AND PRODUCTION

Preferably in new fields. I am a private party and am not buying for resale. Please do not submit cats and dogs. Box E-218, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCING ROYALTIES
WANTED
ANY AREA

BERN SECURITIES CO., INC.
111 Broadway New York 6, N. Y.
WOrth 4-7546

LEASE AND DRILLING BLOCKS

OHIO Better shallow wells and acreage 700 ft. natural. Will flood F. N. Keller Jr. legacy. N. Y.

DESIRE finance to re-drill old Brown County shallow pool. W. H. Mahon, P. O. Box 621, Brownwood, Texas.

FOR SALE: Oil and Gas Leases and Drilling Properties on leases adjoining producing leases. Depth of Drilling 500 to 700 feet. W. P. Harley, Bowling Green, Ky.

WANTED: Proven West Texas leases. Will pay cash and override. Box 2826, Odessa, Texas.

Lea and Roosevelt Counties, New Mexico Royalty. E. ½ S. 18-T9S-R33E 20A $15 per acre. Lease N. ½ S. 15-T11S-R33E, NW. S21-T14S-R36E, E. S21-T14S-R35E. E. ½ S15-T15S-R36E 20A undivided in each 40 per acre bonus plus $200 per acre oil or production. 1105 W. Symmes, Norman, Oklahoma.

LOOKING FOR A LEASE? There will be over 40,000 wells drilled this year. If you are looking for a lease, drilling block or drilling deal and haven't found it in this column, or if you have a lease or drilling block you want drilled, a Journal classified advertisement can find an interested party. See box heading for classified rates, or write The Oil and Gas Journal.

WANTED PROVEN LEASES: Proven leases on upper Gulf Coast and East Texas wanted for drilling. Finances and casing available to develop proven leases, if not too heavily loaded with bonuses to overproduce. Map showing acreage together with subsurface information or geology that indicates profitable oil production together with guarantee you are able to assign acreage if satisfactory discovery be worked out, must be furnished. Will treat deal with utmost confidence. Prefer to make a deal and will not entertain gamblers or frequency deals. Box E-215, The Oil and Gas Journal, Tulsa, Oklahoma.

HAVE 700 acres in Kentucky on excellent geology. Well drilled to 1427 showed oil and gas at 1,035 ft. Ten pays to 1,600 ft. Will deal half interest for well. Box E-221, The Oil and Gas Journal, Tulsa, Oklahoma.

SOLICITING cooperation of drilling contractors or operators with shallow rotary equipment, suitable developing zones from 1300 feet to 5500 feet to participate in drilling program. We own approximately 10,500 acres Reverse and Fee leases in LaBarge field, Lincoln and Sublette Counties, Wyoming. North block offsets Texas Co. production which produced over 12 million barrels very shallow depth to date. General Petroleum's well north our properties tested 190 barrels per day 36 gravity oil from Frontier formation and now drilling deeper. Carter Shamrock well spudded in test well east our block. Prudential operators obtained estimated gas potentials ranging from 30 million to over 100 million cubic feet per day at about 2000 feet on and adjacent our leases. Offered substantial figures for shooting options for deep tests from major oil companies. Tidelands Gas and Oil Co., 200 N. Third St., Alpine, Quercus N. Mex.

LEASES ROYALTIES

Producing and Nonproducing
Bought and Sold. Any Area
Inquiries Invited

E. D. BUCKLEY
6635 Delmar Ave., St. Louis 5, Mo.

Opportunities for Leasing 130,000 Acres in Central and Eastern Kansas

Some suitable for waterflooding. Will consider long term leases on reasonable terms. Details on request.

J. C. HATFIELD
The Union Central Life Insurance Co.
Box 177, Cincinnati 1, Ohio

LEASE AND DRILLING BLOCKS

Opportunities for Leasing More Than 100,000 Acres in Eastern North Dakota

Will consider long term leases 25c per acre on entire acreage. Details on request.

J. C. HATFIELD
The Union Central Life Insurance Co.
Box 177, Cincinnati 1, Ohio

FOR SALE: 640 acres Big Horn County, Wyoming (very hot); 20,000 acres in Central and Eastern Montana (scattered counties); 20,000 acres North Dakota; 30,000 acres South Dakota; 10,000 acres Colorado; 30,000 acres Nebraska (scattered counties). Prices and terms to properly interested parties. Dyer, O.J. 1835 Champa St., Denver, Colorado.

SCURRY CO., Tex. Have substantial acreage Snyder, Stanton, Luft, Quahada, Texas. Want development for oil and gas. V. A. Epp, Pioneer Hotel, Tucson, Arizona.

FOR lease or one-eighth basis for oil and gas 100,000 acres on the Cumberland Plateau in Tennessee for test drilling. This plateau is part of the Appalachian Coal, oil and gas field and is Tennessee's coal basin. Both oil and gas is being produced from wells nearby. G. E. Harrison, owner, Crossville, Tennessee.

OIL Leases in Trigg County, Ky. our rotating drilling well just started. Priced to sell. (Geology L.V.) C. F. Taneyhill, Industrial Engineer, P.O. Box 301, Bowling Green, Kentucky.

WILL trade new pipe for interest in proven well. Write Box 2826, Odessa, Texas.

PARTNER WANTED. Practical mining operator owning extensive mining properties, free and clear of encumbrance, requires one or more partners with one million dollars for large production of copper. Capital gain program. Tax free. Bond, 1240 C.O.F. Bldg., Detroit, Mich.

RANCHES AND FARM LANDS

OUTSIDE promotion zone. 165,000 and 45,000 acres well improved hereford ranches. Good grass, plenty water. Price $5.00 per acre including above Government certificate of investment furnished. Retain citizenship. Jack Birmingham, Box 2126, Abilene, Texas.

IN OLD MEXICO: 135,000 acres, Tampico district, formerly Empire Oil Co. lease. Best ranch and agricultural land in coastal Mexico. Price $7.00 per acre. Jack Birmingham, Box 2126, Abilene, Texas.

PRODUCTION SOURCE

PRODUCTION BUYERS
Valuation Geologist experienced in checking properties for bank loans desires to represent company looking for production in Oklahoma. Box 211, The Oil and Gas Journal, Tulsa, Oklahoma.

REAL ESTATE

SPACE IS NEEDED. A Journal display classified advertisement is the quick, easy way to rent or sell your real estate. In the present period of expansion oil industry firms urgently need the space you have available. If it isn't listed here, you may also find it by stating your needs in these pages. For classified rates see box heading or write The Oil and Gas Journal.

LEGAL BLANKS

BURKHART LEGAL BLANKS since 1908. Oil Gas (all states). Business, Real Estate Legal Forms, Leases, Revised With Government Regulations. Commercial Printing Catalog and Samples on request. Burkhart Printing & Stationery Company, 118 South Cincinnati, Tulsa 3, Oklahoma.

EQUIPMENT MEN

(Continued from page 155)

Merritt Attends PESA Convention in Quebec

John Merritt, general manager of Patterson-Ballagh Division of Byron Jackson Co., left recently for a European business trip, his first stop being the P.E.S.A. convention in Quebec, Canada. From Quebec Merritt flew to London and the continent where he will confer with British and French manufacturers who are licensees of Byron Jackson.

Duffy is District Manager Of General American

General American Transportation has appointed Ben King Duffy as district sales manager of the plate and welding division for the Pittsburgh district, covering the western half of Pennsylvania, eastern half of Kentucky, and Ohio, West Virginia, and Tennessee.

Duffy will have charge of sales for such General American products as are fabricated by the company's plate and welding division, as well as Wiggins conservation structures and Wiggins gas holders.

Koppers New Fontana Plant To Supply West Coast

Initial West Coast production of bituminastic coal-tar pipe-line enamels will begin this fall at the new Fontana, Calif., plant of Koppers Co., Inc., Fred C. Foy, vice president and general manager of the company's tar-products division, announced.

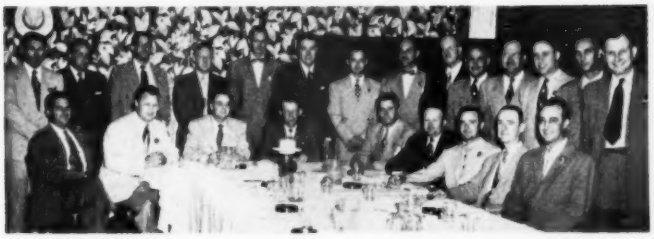
This new plant, located on a 158-acre site near the large Kaiser Steel Co. works, will be the first plant to produce coal-tar-base pipe-line enamels on the West Coast.

Continental Supply Names Two Store Managers

R. A. Brewer, district manager of the Kansas-Oklahoma district of The Continental Supply Co., has announced that F. E. Prosser, former field salesman at Liberal, Kans., has been appointed store manager at Liberal. J. A. Vogle, former store manager at Liberal has been transferred to Ellinwood, Kans., in the same capacity.

The Liberal and Ellinwood stores are under the supervision of R. O. Hambric, assistant district manager.

Norris Holds Annual General Sales Conference



W. C. Norris Manufacturer, Inc., recently held its fifth annual general sales conference at Tulsa with Edward C. Bolger, president, and headquarters' staff as hosts. Seated are: Jack C. Schaff, Wichita Falls; Arthur Miller, Jr., assistant sales manager; G. W. Davidson, sales manager; M. L. Parker, Odessa; LeRoy Mitchell, Casper; Jack Getty, Shreveport; A. L. Ethriedge, Oklahoma City; R. A. Colgin, vice president in charge of plant operations; S. A. McGill, Odessa. Standing: C. B. Schofield, Tulsa city sales; J. E. Giles, Northern Oklahoma and Eastern Kansas; D. W. Stewart, Midland; D. P. Hagaman, Salem, Ill.; J. H. Coman, manager material control; Edward C. Bolger; W. J. Whitaker, Fort Worth; A. A. Hardy, chief engineer; J. W. Bowen, Houston; W. C. Tolleson, Kilgore, Tex.; C. T. Fair, Great Bend, Kans.; W. L. Butler, executive vice president; C. L. Snelling, Tulsa city sales, and K. M. Cook, Abilene, Tex.

Cox Heads Rocky Mountain District for Petroleum

Vernon Cox, manager of the Rocky Mountain area for Petroleum Distributing Co., has recently moved his headquarters from Worland to Casper, Wyo., where Petroleum is opening a branch warehouse. Cox covers all drilling-rig activity in Utah, Colorado, Montana, North and South Dakota, Nebraska, and Wyoming.

Petroleum, whose general offices are in Houston, is distributor of quality petroleum products and Jimmie Gray tool-joint compounds, and has branch warehouses in all active oil fields.

Adams Named to District Sales Post of Yale & Towne

Hubert Kenneth Adams, Jr., Brookhaven, Ga., has been appointed district sales representative of the pump sales department of the Stamford division of The Yale & Towne Manufacturing Co., as announced by William D. Jameson, pump sales manager. Adams will be responsible for the sale of Yale & Towne's line of trirotor pumps in a territory comprising 18 states south of Pennsylvania, including the Southwest.

Adams came to Yale & Towne from Coca-Cola Co. Previously, his experience was in various engineering capacities with Plantation Pipe Line Co., Atlanta; Bell Aircraft Corp., Marietta, Ga.; Air Material Command, Warner Robins, Ga.; and Georgia Power Co., Macon, Ga.

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LEGAL

Sealed Bids will be received until 2:00 P.M., MST., August 1, 1951 in the office of the Superintendent, Northern Cheyenne Agency, Lame Deer, Montana, for the leasing of two units of Tribal Indian Land, located on the Northern Cheyenne Indian Reservation, Montana; unit No. 1 comprising 14,055.56 acres and unit No. 2 comprising 10,403.80 acres, or a total of 24,459.36 acres. Details of the advertisement can be obtained from the Superintendent, Northern Cheyenne Agency, Lame Deer, Montana.

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...*"It was easy to conduct a person-to-person canvass at all company plants and offices"*

ROY A. HUNT
President, Aluminum Company of America

"Our employees like the Payroll Savings Plan for U. S. Savings Bonds. It was easy, therefore, to conduct a person-to-person canvass at all company plants and offices.

"I believe every company which promotes the systematic investment in U. S. Savings Bonds in this way provides a highly desirable service for its employees and at the same time gives practical support to an important national effort."

Yes, it *is* easy to conduct a person-to-person canvass of your offices and plants to ascertain who wants to help America and build for his or her security by the systematic purchase of U. S. Defense Bonds through the Payroll Savings Plan. Have you conducted a person-to-person canvass in your plant?

If you haven't, here are the three easy steps:

- Phone, wire or write to Savings Bond Division, U. S. Treasury Department, Suite 700, Washington Building, Washington, D. C.
- Your State Director, U.S. Treasury Department, will contact you or the executive you designate to conduct the canvass and tell you exactly how to proceed. He will furnish posters, pay envelope stuffers, application blanks and other aids.
- All you have to do is to see that every employee in your company is handed a Payroll Savings Application and given an opportunity to make his or her own decision. No pressure is needed.

Simple as the plan is, it works — to the benefit of employees, the company and America. In the last six months approximately 4,000 more companies have installed the Payroll Savings Plan for their employees. Approximately 600,000 working men and women have joined the millions of smart savers already on the Payroll Savings Plan. In plant after plant, employee participation has jumped to 70%, 80% — even 90% because, as Mr. Hunt so aptly puts it, "employees like the Payroll Savings Plan."

Make it easy for *your* employees to help themselves, their Country and their company by the systematic purchase of U. S. Savings Bonds — Defense Bonds now, because they are an important factor in combating inflation and building a stronger America.

The U. S. Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the Advertising Council and

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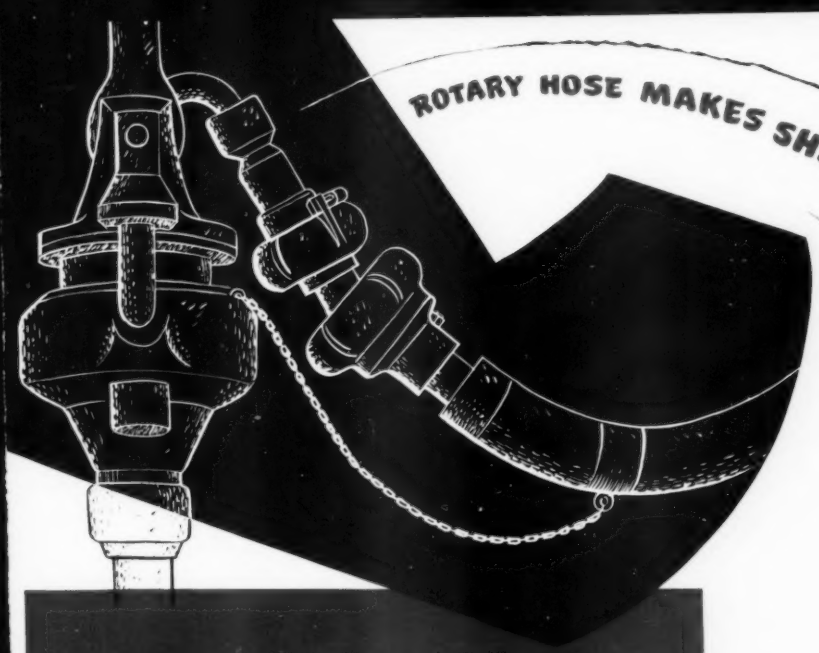
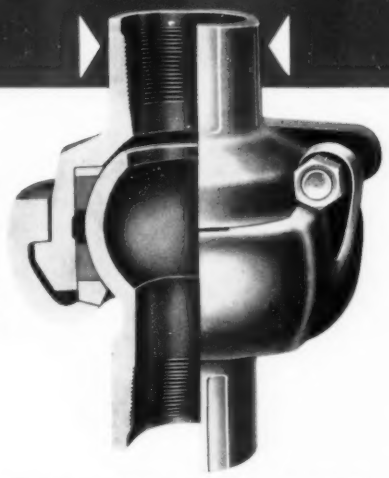


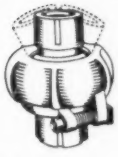
ROTARY HOSE MAKES SHARP BENDS, TOO . . . .

UNIBOLT FLEXI-BALL JOINTS

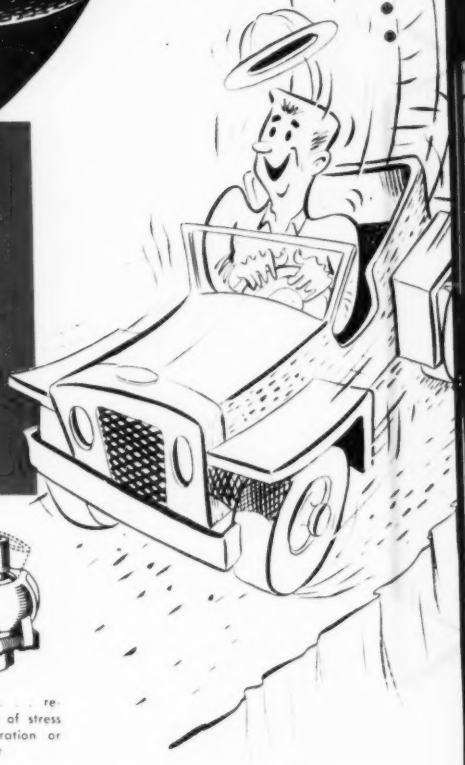
Relieve the Strain

IT SWIVELS . . . an advantage when making up in a manifold.





IT FLEXES . . . relieving lines of stress due to vibration or misalignment



Relieving rotary hose of damaging strains is one of several popular applications of UNIBOLT Flexi-Ball Joints. They are equally desirable in mud manifolds to facilitate making up misaligned connections and to keep them free of stress; on steam lines to protect them against contraction and expansion; on any line subject to intermittent vibration and pulsation.

A feature which distinguishes the Flexi-Ball Joint from all others is the use of the UNIBOLT Coupling principle, rather than threaded connections, to connect the ball and socket members. Release only one bolt to break the joint. ***There are no threads to gall and freeze.*** It may be used safely in any service since it is made in steel only. Sizes from 1½" to 6"; test pressures to 6,000 lbs., 500 lbs. steam working pressure.

THORNHILL-CRAVER CO.

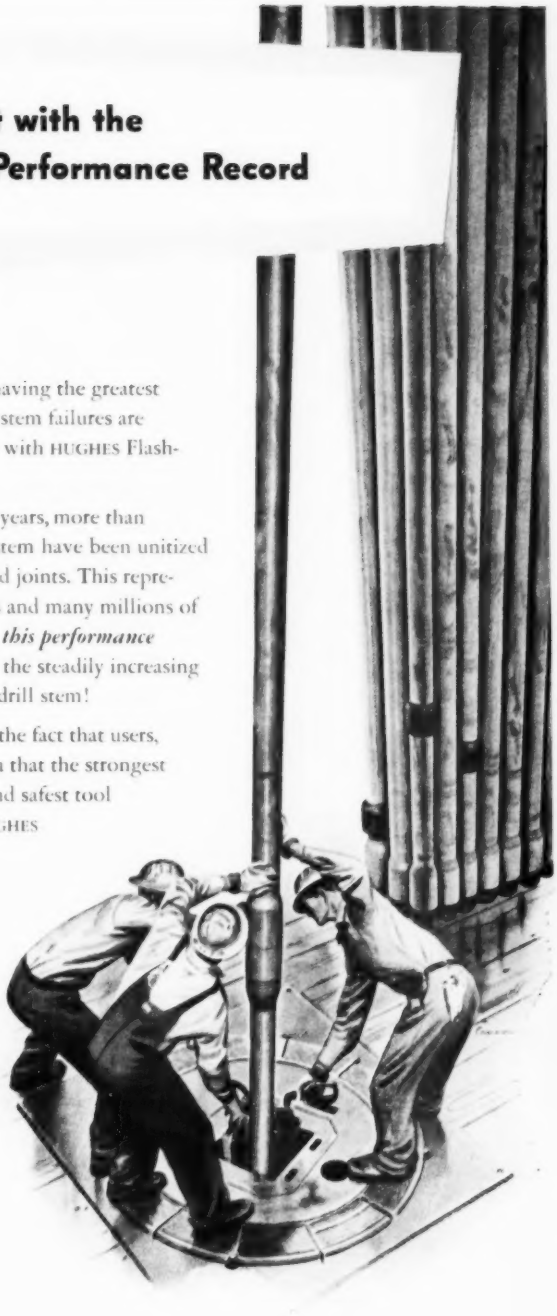
HOUSTON, UNIBOLT **TEXAS**

The Tool Joint with the Proven Performance Record

Operators who are having the greatest success in reducing drill stem failures are unitizing their drill pipe with HUGHES Flash-Weld tool joints.

Over a period of 12 years, more than 19,000,000 feet of drill stem have been unitized with HUGHES Flash-Weld joints. This represents thousands of wells and many millions of feet of hole drilled. It is ***this performance record*** that accounts for the steadily increasing use of HUGHES unitized drill stem!

It also accounts for the fact that users, everywhere, will tell you that the strongest ...most economical...and safest tool joint you can buy is HUGHES Flash-Weld.



FLASH-WELD

A DEVELOPMENT OF

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